Global Albany Annual H_2S Model Assumptions

General Parameters	
Parameter	**Value**
Projection	**UTM**
Datum	WGS84
UTM Zone	18
Hemisphere	Northern
AERMET	2015-2019 MET Data
AERMAP	1-deg DEM Data from webgis.com

Sources	Assumptions/ Notes	Value
Marine VCU (VCUM2) (Point Source) - With Vac Assist		
Emission Rate (lb/hr)	See Calculations Attachment	9.13E-04
Emission Rate (lb/yr)	See Calculations Attachment	8
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Marine VCU (VCUM2) (Point Source) - Crude OS#2		
Emission Rate (lb/hr)	See Calculations Attachment	8.20E-04
Emission Rate (lb/yr)	See Calculations Attachment	7.18
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Barge Fugitives (Area Source) Crude OS#2 Only		
Emission Rate (lb/hr/ft^2)	See Calculations Attachment	9.62E-09
Emission Rate (lb/yr)	See Calculations Attachment	0.773
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft^2)	Barge Area	9178.8
Tank 31 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.51E-03
Emission Rate (lb/yr)	See Calculations Attachment	13.22
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.51E-03
Emission Rate (lb/yr)	See Calculations Attachment	13.23
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.33E-03
Emission Rate (lb/yr)	See Calculations Attachment	11.63
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93

Tank 120 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	7.60E-04
Emission Rate (lb/yr)	See Calculations Attachment	6.66
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.10E-03
Emission Rate (lb/yr)	See Calculations Attachment	9.67
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.67E-03
Emission Rate (lb/yr)	See Calculations Attachment	14.63
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	8.30E-04
Emission Rate (lb/yr)	See Calculations Attachment	7.28
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.11E-03
Emission Rate (lb/yr)	See Calculations Attachment	9.69
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	1.05E-03
Emission Rate (lb/yr)	See Calculations Attachment	9.20
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Crude) (Volume Source)		
Emission Rate (lb/hr)	See Calculations Attachment	2.17E-03
Emission Rate (lb/yr)	See Calculations Attachment	19.04
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

ATTACHMENT 2

Model Protocol Calculations

A summary table of the parameters to use in the modeling is attached to the modeling protocol. The following sections detail the calculations used to determine emission rates for the modeling. Calculations for non-HTACs will be completed using the same methods as benzene, and emission rates used in the modeling will be provided in the report.

Annual Modeling Benzene – Tank Sources

Each tank is modeled as a volume source with the worst-case emissions, as described below. Annual emission rates are provided in the attached tables.

Vertical Fixed Roof Tanks

Tanks 28, 29, 30, 33, and 64 will be modeled based on PTE emissions with distillate fuel oil 2, with both standing and working losses included.

IFR Tanks without Blendstock Storage

Tanks 31, 32, 39, and 120 will be modeled based on the worst-case standing and working losses and landings as follows:

- Standing Losses – worst case of standing losses (gasoline)
- Working Losses – worst case benzene emissions from working losses (gasoline) plus crude working losses
- Example calculation for Tank 31:
    - Benzene emissions (lb/yr) = Benzene standing losses for gasoline (lb/yr) + Benzene working losses for gasoline (lb/yr) + Benzene working losses for crude (lb/yr) + Benzene losses due to landings (lb/yr) = 43.94 lb/yr + 6.56 lb/yr + 2.82 lb/yr + 30.36 lb/yr = 83.7 lb/yr

IFR Tanks with Blendstock Storage

IFR Tanks 114, 115, 117, 118, 119, and 121 – Modeled based on the worst-case standing and working losses and landings as follows:

- Standing Losses – worst case of standing losses (blendstock)
- Working Losses – worst case benzene emissions from working losses of gasoline and distillate (gasoline) plus blendstock working losses plus crude working losses
- Example calculation for Tank 117:
    - Benzene emissions (lb/yr) = Benzene standing losses for blendstock (lb/yr) + Benzene working losses for gasoline (lb/yr) + Benzene working losses for blendstock (lb/yr) + Benzene working losses for crude (lb/yr) + Benzene losses due to landings (lb/yr) = 20.99 lb/yr + 4.94 lb/yr + 1.45 lb/yr + 2.14 lb/yr + 30.36 lb/yr = 59.9 lb/yr

Tank Landings in Annual Model

The initial model iteration will be completed assuming that the 22 tons per year of emissions from landings will be evenly distributed between the tanks (2.2 tons per year per tank) and the worst-case speciation for July (0.69% benzene). A sensitivity analysis will then be completed to determine the impact of changing the number of landings at different tanks, while staying within the 22 tons per year limit.

Tank 130 – Product Water Tank

IFR tank 130 will be modeled with standing and working losses as calculated in the PTE.

<u>Hourly Modeling Benzene – Tank Sources</u>

Each tank is modeled as a volume source. Vertical fixed roof tanks are modeled with the same emission rates as the annual model. IFRs are modeled assuming one tank is landing, with annual emission rates at the other IFR tanks. The worst-case hour of landing is used for the hourly model, with filling losses assumed as the worst-case. Landings for Tanks 31 and 32, though modeled in the PTE as ethanol, will be recalculated for the purposes of the modeling with the worst-case product assumed.

The time to fill the tank is calculated based on a filling rate of 1000 to 1500 bph provided by the terminal. Multiple tank landings at the same time may be evaluated based on the results. An example is provided below, but, because this calculation could be scenario and product-dependent, the emission rates are not provided with this protocol. The final emission rates will be provided in the report.

Hourly cleaning calculations will also be completed as part of the modeling to determine the worst-case hour and emission rates provided with the final report. An example calculation is provided at the end of this attachment for tank 117.

<u>Example calculation for Landing Tank 117:</u>

The landing in this calculation is assumed to occur in July with filling emissions calculated based on the vapor molecular weight and true vapor pressure of RVP 9 gasoline at Albany, NY temperatures and a 1500 bph refill rate to refloat the roof.

Worst-case hourly landing losses = Filling losses for one landing * July Speciation for Blendstock/ 4.5 hours = 1862 lb/ landing for filling * 0.00691/ 4.5 hours = 2.9 lb/hr

<u>Annual Modeling Benzene – Loading Calculations</u>

For the annual model, iterative modeling will be completed to determine worst-case loading scenarios based on the Operating Scenarios proposed for the facility. Given that there are many different emission rate options that will be evaluated, specific annual emission rates are not included in the accompanying tables for loading scenarios. An example calculation is provided below to demonstrate the method for calculating emission rates. An exhaustive list of modeling scenarios will not be provided in advance of the modeling effort because it will be iterative and will depend on results obtained as modeling is completed.

Example calculations for a potential loading scenario are provided for truck, rail and marine. This is shown as an example only and may not be submitted as part of the model report. The actual loading scenarios used in the modeling will be submitted in the final report. Calculations for other scenarios would be calculated using the same methods, with throughputs and emission limits adjusted as necessary depending on the assumptions for the specific model run. As described in the Permit Application submitted December 16, 2020, compliance with the emissions limits for refined product loading is determined based on the following equation:

Total Throughput of Refined Product (kgal) = (kgal loaded from OS #1) + (kgal loaded from OS#2/ 0.81) + (kgal loaded from OS#3/ 0.2) + (kgal loaded from OS#4/ 0.2) + (kgal loaded from OS#5/ 0.2)

The upper limit for the total throughput of refined product is 1,928,300 kgal. The Operating Scenarios are defined as follows:

#1: Loading at truck, rail and/or marine at 2 mg/L with vac assist

#2: Marine loading of inerted vessels at 2 mg/L (99.9%)

#3: Marine loading with VCUM1 (10 mg/L) with vac assist

#4: Truck loading with no vac assist (2 mg/L and 8 mg/L fugitives)

#5: Rail loading with no vac assist (2 mg/L and 8 mg/L fugitives)

For the example calculations in this section, the following throughputs were assumed:

- 100,000,000 gallons of refined product under Operating Scenario 4
- 50,000,000 gallons of refined product under Operating Scenario 5
- 235,660,000 gallons of refined product under Operating Scenario 3

The total throughput used for the compliance equation would be calculated as follows:

Total Throughput of Refined Product (kgal) = 0 kgal loaded from OS#1 + 0 kgal loaded from OS#2/ 0.81 + 235,660 kgal from OS#3/ 0.2 + 100,000 kgal from OS#4/ 0.2 + 50,000 kgal from OS#5/ 0.2

Total Throughput of Refined Product (kgal) = 0 kgal + 0 kgal + 1,178,300 kgal + 500,000 kgal + 250,000 kgal = 1,928,300 kgal

Example Calculations – Truck Loading

Example of Truck VRU calculation:

The following assumes that 100,000,000 gallons of refined product are loaded at the truck rack under Operating Scenario #4 as an example calculation:

Emissions (lbs), Total VOCs = Refined Product Throughput at Truck Rack (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 100,000,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 1,668.9 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 1,668.9 lb/yr * 0.0046 = 7.68 lb/yr

Benzene emissions, lb/hr = 7.68 lb/yr * 1 yr/ 8760 hrs = 8.76E-4 lb/hr

Example of Truck Fugitives calculation:

The following assumes that 100,000,000 gallons of refined product are loaded at the truck rack under Operating Scenario #4 as an example calculation:

Emissions (lbs), Total VOCs = Refined Product Throughput at Truck Rack (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 100,000,000 gallons * 3.785 liters/gallon * 8 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 6,675.5 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 6,675.5 lb/yr * 0.0046 = 30.7 lb/yr

Benzene emissions, lb/hr = 30.7 lb/yr * 1 yr/ 8760 hrs = 0.0035 lb/hr

Example Calculations – Rail Loading

Example of Rail VCU calculation:

The following assumes that 50,000,000 gallons of refined product are loaded at rail under Operating Scenario #5 as an example calculation:

Emissions (lbs), Total VOCs = Refined Product Throughput at Rail (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 50,000,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 834.4 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 834.4 lb/yr * 0.0046 = 3.84 lb/yr

Benzene emissions, lb/hr = 3.84 lb/yr * 1 yr/ 8760 hrs = 4.38E-4 lb/hr

Example of Rail Fugitives calculation:

The following assumes that 50,000,000 gallons of refined product are loaded at rail under Operating Scenario #5 as an example calculation:

Emissions (lbs), Total VOCs = Refined Product Throughput at Rail (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 50,000,000 gallons * 3.785 liters/gallon * 8 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 3,337.8 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 3,337.8 lb/yr * 0.0046 = 15.4 lb/yr

Benzene emissions, lb/hr = 15.4 lb/yr * 1 yr/ 8760 hrs = 0.00175 lb/hr

Example Calculations – Marine Loading

Example of Marine VCUM1 calculation:

The following assumes that 235,660,000 gallons of refined product are loaded at VCUM1 under Operating Scenario #3 as an example calculation:

Emissions (lbs), Total VOCs = Refined Product Throughput at Marine (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 235,660,000 gallons * 3.785 liters/gallon * 10 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 19,664.4 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 19,664.4 lb/yr * 0.0046 = 90.46 lb/yr

Benzene emissions, lb/hr = 90.46 lb/yr * 1 yr/ 8760 hrs = 0.0103 lb/hr

Hourly Modeling Benzene – Loading Calculations

Hourly emission rates for loading are provided in the attached tables. Details on how these emission rates were calculated and how they would be utilized in the model are provided below.

Truck Rack VRU Hourly Modeling

The hourly emission rate at the truck rack VRU is based on a maximum loading rate of 4000 gpm and an emissions limit of 2 mg/l to calculate the total VOC emissions. Benzene emissions are then calculated based on the average speciation for the year for gasoline (0.46%) as a worst-case. The calculation is as follows:

Maximum Short Term Loading Rate (liters/hr) = 4000 gallons/minute * 3.785 liters/gallon * 60 minutes/hr = 908,498.8 liters/hr

Total VOCs (g/hr) = 2 mg/l * 908,498.8 liters/hr * 1 g/ 1000 mg = 1,816.998 g/hr

Total VOCs (lb/hr) = 1,816.998 g/hr * 0.00220462 lb/ g = 4.006 lb/hr

Benzene (lb/hr) = Total VOCs * 0.0046 = 4.006 lb/hr * 0.0046 = 0.0184 lb/hr

Truck Fugitives Hourly Modeling

Truck fugitives, which are only part of Operating Scenario #4, are calculated based on an emission limit of 8 mg/l and a maximum short-term loading rate of 4000 gpm. The emissions calculation was completed using the same method as the truck rack VRU, with 8 mg/l used instead of 2 mg/l. Benzene emissions are calculated based on the average speciation for the year for gasoline (0.46%).

Rail VCU Hourly Modeling

The hourly emission rate at the truck rack VRU is based on a maximum loading rate of 4500 gpm and an emissions limit of 2 mg/l to calculate the total VOC emissions. Benzene emissions are then calculated based on the average speciation for the year for gasoline (0.46%). The emissions calculation was completed using the same method as the truck rack VRU, with 4500 gpm used as the maximum loading rate.

Rail Fugitives Hourly Modeling

Rail fugitives, which are only part of Operating Scenario #5, are calculated based on an emission limit of 8 mg/l and a maximum short-term loading rate of 4500 gpm. The emissions calculation was completed using the same method as the truck rack VRU, with 8 mg/l used instead of 2 mg/l. Benzene emissions are calculated based on the average speciation for the year for gasoline (0.46%).

Marine VCU (VCUM1) Hourly Modeling

Benzene emissions are calculated based on the average speciation for the year for blendstock (0.46%) or crude (0.26%), depending on the assumptions in the model iteration. The maximum loading rate for VCUM1 used for the modeling will be 4000 barrels/hr (168,000 gallons/hr) with an emission rate of 10 mg/l. The example calculation for blendstock is provided below:

Maximum Short Term Loading Rate (liters/hr) = 168,000 gallons/hr * 3.785 liters/gallon = 635,949.2 l/hr

Total VOCs (g/hr) = 10 mg/l * 635,949.2 liters/hr * 1 g/ 1000 mg = 6,359.5 g/hr

Total VOCs (lb/hr) = 6,359.5 g/hr * 0.00220462 lb/ g = 14.02 lb/hr

Benzene (lb/hr) = Total VOCs * 0.0046 = 14.02 lb/hr * 0.0046 = 0.0645 lb/hr

If one of the model iterations were to include only crude at VCUM1, the same calculation would be completed only with 0.26% benzene used for the speciation for crude loading.

Marine VCU (VCUM2) Hourly Modeling

The emissions calculation was completed using the same method as the example for VCUM1, with the maximum loading rate for VCUM2 of 25,000 barrels/hr (1,050,000 gallons/hr) and an emission rate of 2 mg/l used in the calculation. Benzene emissions are calculated based on the average speciation for the year for blendstock (0.46%) or crude (0.26%), depending on the assumptions in the model iteration.

Marine Fugitives Hourly Modeling

Marine fugitives, which are part of Refined Operating Scenario #2 and Crude Operating Scenario #2 (CRD2), are calculated based on an emission factor of 3.9 lb/1000 gallons for an uncleaned barge and 25,000 barrels per hour as a worst-case short term loading rate. It is assumed that 99.9% of emissions go to the VCU with 0.1% emitted as fugitives. Benzene emissions are calculated based on the average speciation for the year for blendstock (0.46%) or crude (0.26%), depending on the assumptions in the model iteration. The example calculation for blendstock is provided below:

Total VOCs emitted as Fugitives (lb/hr) = Emission Factor * Volume Loaded kgal/hr * fraction emitted as fugitives = 3.9 lb/1000 gallons * 1,050 kgal/hr * 0.001 = 4.1 lb/hr

Benzene emitted as fugitives (lb/hr) = 4.1 lb/hr * 0.0046 = 0.0188 lb/hr

Benzene emitted as fugitives (lb/hr/ft^2) = 0.0188 lb/hr/ 9178.8 ft^2 = 2.05E-6 lb/hr/ft^2

Annual Modeling Hydrogen Sulfide

A table of annual model inputs is provided with the modeling protocol.

Tank Sources

For each of the IFR tanks, H_2S emissions were calculated by multiplying the total standing and working losses during crude storage by the vapor fraction of 0.00118 for H_2S. One crude landing per tank is assumed for the purposes of this modeling only.

Example calculation for tank 117:

H_2S emissions (lb/yr) = (Total standing losses during crude storage (lb/yr) + working losses during crude storage (lb/yr) + Total Landing Losses (lb/yr)) * vapor fraction of H_2S

H_2S emissions (lb/yr) = (2410.11 lb/yr + 357.34 lb/yr + 3402 lb/yr) * 0.00118 = 7.28 lb/yr

Loading calculations

Example calculation with vac assist only

The calculations provided in the PTE for VCUM2 will be used to derive the H_2S emissions for this point source for one of the model iterations, as follows:

VCUM2 H_2S Emissions (lb/yr) = Emissions in tons/yr * 2000 lbs/ton = 0.004 tons/yr * 2000 lbs/ton = 8 lb/yr

Example calculation for Crude Operating Scenario #2 with fugitives

A model iteration will also be completed assuming the maximum loading of crude under Operating Scenario 2 (CRD2) to calculate the emissions including barge fugitives. This calculation assumes that no crude loading occurs under the other 2 model scenarios as a worst-case for fugitive emissions.

Control device emission rate (lb/1000 gallons) = Emission rate in mg/l * 0.00834540445 (conversion factor) = 2 mg/l * 0.00834540445 = 0.0167 lb/1000 gallons

Emission factor (in lb/1000 gallons) = 1.7975 (see Marine Loading – Crude Oil in PTE)

VCUM2 Total VOC Emissions (lb/yr) = Control device emission rate (lb/1000 gallons) * Throughput in kgal = 0.0167 lb/1000 gallons * 364,500 kgal = 6,087 lb/yr

VCUM2 H_2S Emissions (lb/yr) = Total VOC Emissions in lb/yr * vapor fraction of H_2S = 6,087 lb/yr * 0.00118 = 7.18 lb/yr

Barge Fugitive Total VOC Emissions (lb/yr) = Emission factor (lb/1000 gallons) * Throughput in kgal * Fraction of emissions as fugitives = 1.7975 lb/1000 gallons * 364,500 kgal * 0.001 = 655.2 lb/yr

Barge Fugitive H_2S Emissions (lb/yr) = Total VOC Emissions in lb/yr * vapor fraction of H_2S = 655.2 lb/yr * 0.00118 = 0.773 lb/yr

Barge Fugitive H_2S Emissions (lb/hr) = H_2S Emissions in lb/yr * 1 yr/ 8760 hrs = 0.773 lb/yr * 1/8760 = 8.83E-5 lb/hr

Barge Fugitive H_2S Emissions (lb/hr/ft^2) = H_2S Emissions in lb/hr/ Surface Area of Barge in ft^2 = 8.83E-5 lb/hr/ 9178.8 ft^2 = 9.62E-9 lb/hr/ft^2

Hourly Modeling Hydrogen Sulfide

Tank Sources

IFRs will be modeled assuming one tank is landing, with annual emission rates at the other IFR tanks. The worst-case hour of landing is used for the hourly model, with filling losses assumed as the worst-case. The time for filling will be calculated based on a filling rate of 1000 to 1500 bph.

Tank landing emissions were calculated for crude tanks only for the purposes of the hourly H_2S modeling and are presented in the following table. Crude landings were not included for the benzene modeling because gasoline speciation results in a higher benzene content so that would be considered the worst-case.

For each tank that is landed, the emissions will be calculated as follows:

H_2S Emissions During Landing (lb/hr) = Filling losses for one landing * H_2S vapor fraction/ hours for filling

Example calculation for Tank 117 (Assuming 1500 bph filling rate):

H_2S Emissions During Landing (lb/hr) = 2,609 lb/landing * 0.00118 / 4.51 hours = 0.68 lb/hr

Emissions rates will be provided with the modeling report since they are dependent on the filling rates assumed for the different model iterations.

Loading Sources

Total VOC emissions would be calculated in the same way for the hourly H_2S modeling as for the hourly benzene model, with the vapor fraction of H_2S of 0.00118 applied.

	CRUDE LANDING Tank Numbers									
	117	**118**	**119**	**120**	**121**	**114**	**115**	**31**	**32**	**39**
Tank Diameter (ft)	110	100	80	80	150	120	150	125	125	125
Heel Height (ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Volume (ft3)	38,013	31,416	20,106	20,106	70,686	45,239	70,686	49,087	49,087	49,087
Volume (bbl)	6,771	5,596	3,581	3,581	12,590	8,058	12,590	8,743	8,743	8,743
Volume (gal)	284,377	235,023	150,414	150,414	528,801	338,432	528,801	367,223	367,223	367,223
Volume (liters)	1,076,368	889,560	569,319	569,319	2,001,511	1,280,967	2,001,511	1,389,938	1,389,938	1,389,938
Avg Temp (F) (T)	54.18	54.18	54.18	54.18	54.18	54.18	54.18	54.18	54.18	54.18
Avg Temp (K) (T)	285.47	285.47	285.47	285.47	285.47	285.47	285.47	285.47	285.47	285.47
temp corr	0.9568	0.9568	0.9568	0.9568	0.9568	0.9568	0.9568	0.9568	0.9568	0.9568
Moles	45,978	37,998	24,319	24,319	85,496	54,718	85,496	59,372	59,372	59,372
VP of VOC (psia)	12.61	12.61	12.61	12.61	12.61	12.61	12.61	12.61	12.61	12.61
VOC theo fraction	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Saturation Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Moles VOC	23,665	19,558	12,517	12,517	44,004	28,163	44,004	30,559	30,559	30,559
Molecular weight (g/g-mole)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
VOC (grams/landing)	1,183,230	977,876	625,841	625,841	2,200,221	1,408,141	2,200,221	1,527,931	1,527,931	1,527,931
VOC (lbs/landing)	2,608.53	2,156	1,380	1,380	4,851	3,104	4,851	3,368	3,368	3,368
Number of Landings per Yr	1	1	1	1	1	1	1	1	1	1
Average Days per Landing	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC (lbs) Filling	2,609	2,156	1,380	1,380	4,851	3,104	4,851	3,368.45	3,368.45	3,368
VOC (lbs) Standing	793	655	419	419	1,475	944	1,475	1,024.01	1,024.01	1,024
VOC (lbs) Filling - One landing	2,609	2,156	1,380	1,380	4,851	3,104	4,851	3,368.45	3,368.45	3,368
Total VOC (lbs) (Lf + Ls)	3,402	2,811	1,799	1,799	6,325	4,048	6,325	4,392	4,392	4,392
Total VOC (tons)	1.70	1.41	0.90	0.90	3.16	2.02	3.16	2.20	2.20	2.20

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**8,493.21**	**lb/event**
		4.2466	**ton/event**

Product in tank prior to cleaning		Gasoline - RVP 9	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	8	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ventila	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	$\mathbf{L_P}$	1881.270	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole
Average temperature of the vapor space = average ambient temperatu	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	5.774	
Volume of vapor space	V_V	54,644.08	
Stock vapor molecular weight	M_V	68	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	$\mathbf{L_{CV}}$	3,403.00	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	8	hrs/day
Average vapor concentration by volume during continued forced ventila	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average ambie	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max =	5.9*D^2*(hl)*WI	99946	
Cvmax =	P_{VA}/Pa	0.396813954	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	$\mathbf{P_{VA}}$	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	$\mathbf{V_V}$	**54,644.08**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*V_V)/R*Tv))*M	$\mathbf{L_{SL}}$	**755.85**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.1848	
True vapor pressure of stock liquid (avg. ambient temp. of mon	P_{VA}	5.774	psia
Volume of the vapor space	V_V	54644.08	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-
Average vapor temperature (average ambient temp of the mon	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	68	lb/lb-mol
Standing idle saturation factor	K_S	0.36	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}$$V_V$/R$T_V$)$M_V$($C_{sf}$S)	$\mathbf{L_{FL}}$	**564.38**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of mon	P_{VA}	5.774	psia
Volume of the vapor space	V_V	54644.08	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the mo	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	68	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DE	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-	**KE**	**0.1848**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.2440	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔT	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.244**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.42	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	5.18	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=TAA for landi	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3
$\mathbf{L_P}$	943.875	944.829
S *	**0.25**	**0.25**
H_l	0.230	0.22
$\mathbf{V_V}$	**54,832.33**	**54,887.72**
h_v	5.77	5.78
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1c

HAPS Speciation

Product type- select from list: Gasoline

Total HAP (lb/event):	**264.014**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**			**Liquid Mole Fraction**				**Component Vapor Pressure**			
Individual HAPS		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA			Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	$\mathbf{L_{Ti}}$ **(lb/event)**	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	$\mathbf{P_i = P_{VAi}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$	**A**	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	51.1805	86.18	68	0.00603	0.027453	5.774	**0.00475**	0.0100000	92	86.18	0.01068	6.878	1171.5	224.37	2.5716
benzene	57.4944	78.11	68	0.00677	0.034026	5.774	**0.00589**	0.0180000	92	78.11	0.02120	6.906	1211	220.79	1.6049
2,2,4 TMP	65.8601	114.23	68	0.00775	0.026652	5.774	**0.00462**	0.0400000	92	114.23	0.03222	6.812	1257.8	220.74	0.8273
toluene	65.6567	92.14	68	0.00773	0.032940	5.774	**0.00571**	0.0700000	92	92.14	0.06989	7.017	1377.6	222.64	0.4713
ethylbenzene	4.2949	106.17	68	0.00051	0.001870	5.774	**0.00032**	0.0140000	92	106.17	0.01213	6.95	1419.3	212.61	0.1541
xylenes	18.7657	106.17	68	0.00221	0.008171	5.774	**0.00142**	0.0700000	92	106.17	0.06066	7.009	1462.3	215.11	0.1347
cumene	0.7292	120.19	68	0.00009	2.80E-04	5.774	**4.86E-05**	0.0050000	92	120.19	0.00383	6.929	1455.8	207.2	0.0733
naphthalene	0.0329	128.17	68	3.88E-06	1.19E-05	5.774	**2.06E-06**	0.0041500	92	128.17	0.00298	7.146	1831.6	211.82	0.0040

ATTACHMENT 3

Global Albany Terminal Hourly ERP Evaluation

		hexane	**2,2,4-TMP**	**toluene**	**ethylbenzene**	**xylenes**
Actual 2020 (lb/year) - (all reported sources)		668.39	923.4	1262.34	210.37	1334.04
Toxicity Rating from DAR-1		M	M	L	M	M
ERP - VRUTK (lb/hr)[a]		0.017	0.021	0.096	0.012	0.228
ERP - VCURR (lb/hr)[b]		0.019	0.023	0.108	0.013	0.256
ERP - VCUM1 (lb/hr)[c]		0.585	0.073	0.337	0.041	0.797
ERP - VCUM2 (lb/hr)[d]		0.731	0.091	0.421	0.051	0.996
ERP - Tank 31 (lb/hr)[e,f]	**1000 bph refill rate**	0.695	0.900	2.600	0.349	6.810
	1500 bph refill rate	1.042	1.350	3.901	0.524	10.215
ERP - Tank 32 (lb/hr)[e,f]	**1000 bph refill rate**	0.695	0.900	2.600	0.349	6.810
	1500 bph refill rate	1.042	1.350	3.901	0.524	10.215
ERP - Tank 39 (lb/hr)[e,f]	**1000 bph refill rate**	1.513	1.959	5.661	0.760	14.826
	1500 bph refill rate	2.269	2.939	8.491	1.140	22.238
ERP - Tank 120 (lb/hr)[e,f]	**1000 bph refill rate**	1.513	1.959	5.661	0.760	14.826
	1500 bph refill rate	2.269	2.939	8.491	1.140	22.239
ERP - Tank 114 (lb/hr)[e,g]	**1000 bph refill rate**	12.352	1.959	5.660	0.760	14.825
	1500 bph refill rate	18.528	2.939	8.491	1.140	22.237
ERP - Tank 115 (lb/hr)[e,g]	**1000 bph refill rate**	12.353	1.959	5.661	0.760	14.825
	1500 bph refill rate	18.529	2.939	8.491	1.140	22.238
ERP - Tank 117 (lb/hr)[e,g]	**1000 bph refill rate**	12.352	1.959	8.491	1.140	22.237
	1500 bph refill rate	18.528	2.939	8.491	1.140	22.237
ERP - Tank 118 (lb/hr)[e,g]	**1000 bph refill rate**	15.187	2.409	6.959	0.934	18.227
	1500 bph refill rate	15.187	2.409	6.959	0.934	18.227
ERP - Tank 119 (lb/hr)[e,g]	**1000 bph refill rate**	18.530	2.939	8.491	1.140	22.239
	1500 bph refill rate	18.530	2.939	8.491	1.140	22.239
ERP - Tank 121 (lb/hr)[e,g]	**1000 bph refill rate**	5.271	0.836	2.415	0.324	6.326
	1500 bph refill rate	5.271	0.836	2.415	0.324	6.326

[a] = The ERP for VRUTK is based on the short-term loading rate of 4000 gpm and the emission limit of 2 mg/l.

[b] = The ERP for VCURR is based on the short-term loading rate of 4500 gpm and the emission limit of 2 mg/l.

[c] = The ERP for VCUM1 is based on the short-term loading rate of 4000 bph and the emissions limit of 10 mg/l.

[d] = The ERP for VCUM2 is based on the short-term loading rate of 25,000 bph and the emissions limit of 2 mg/l.

[e] = Worst-case hour based on refilling the tank after a landing. Refill rates range from 1000 bph to 1500 bph. Both ERPs are provided in the table.

[f] = Speciation for gasoline used as worst-case.

[g] = speciation for blendstock used as worst-case.

Attachment XIV

Modeling Report

PART 212 REVIEW
AIR DISPERSION MODEL REPORT
ALBANY, NY

January 2023

Prepared for:

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1.0 Introduction:

Air dispersion modeling was conducted for the Global Companies LLC (Global) Albany Terminal (Terminal) located in Albany, NY. This facility is classified as a gasoline and distillate loading terminal. It consists of ten (10) permitted petroleum product storage tanks and five (5) exempt distillate storage tanks. The facility has one (1) truck loading rack, one (1) rail loading rack, and a marine loading dock. The truck loading rack is controlled by a Vapor Recovery Unit (VRUTK), rail loading is controlled by a Vapor Combustion Unit (VCURR), and marine loading is controlled by two VCUs (VCUM1 and VCUM2).

This report is being submitted as part of a significant Title V air permit modification application for the facility. Air dispersion modeling is required to determine compliance with 6 NYCRR Part 212. 6 NYCRR Part 212 regulates air pollution from process operations, as defined in the regulation. Each contaminant is assigned an Environmental Rating, which is used to determine the degree of air pollution control required. Facilities with process operations subject to New Source Performance Standards (NSPS) (40 CFR Part 60) and National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 63) are considered in compliance with Part 212 with the exception of compounds on the high toxicity air contaminant (HTAC) list. Facility Potential to Emit (PTE) calculations are completed to determine maximum potential emissions of Volatile Organic Compounds (VOCs) and Hazardous Air Pollutants (HAPs). Pollutants that are considered HTACs are then compared to the mass emission limits specified on 212-2.2 Table 2 – High Toxicity Air Contaminant List. HTACs that exceed the mass emission limit are modeled to demonstrate that fence-line concentrations are below Annual Guideline Concentrations (AGC) for annual emission rates and Short-Term Guideline Concentrations (SGC) for hourly emission rates for the applicable contaminant. HTACs that are below SGC/AGC limits are in compliance with Part 212. The only HTAC emitted from process operations at this facility with emissions exceeding the specified mass emission limit is benzene. Other HAPs are emitted from facility operations, but they are not considered HTACs per 212-2.2 Table 2. These HAPs, which are non-HTACs, are included in this modeling report if actual annual emissions of the non-HTAC is greater than 100 lb/yr.

Air dispersion modeling was conducted to assess if facility emissions result in off-site impacts that exceed the SGC and AGC levels for benzene and non-HTACs with actual annual emissions greater than 100 lb/yr. Modeling was also completed for H_2S emissions from crude oil storage and loading at the request of NYSDEC.

The air dispersion model was completed using Lakes AERMOD View Software (version 10.0.1). The following sections provide the model results as well as information on variables and modeling assumptions that were used when developing the model.

2.0 Facility Overview and Process Description:

Global's Albany Terminal is located at 50 Church Street in Albany, NY. The facility is permitted for petroleum product loading and storage operations. The facility has an overall refined product (gasoline, ethanol, blendstock, distillate, and biodiesel) throughput limit of 1,928,300,000 gallons with subcaps at each rack. There is an additional permitted 450,000,000 gallon throughput for crude oil at the marine dock. The facility has ten (10) permitted petroleum product storage tanks and five (5) exempt distillate storage tanks.

3.0 Modeling Methodology:

The projection to be used for the model will be UTM NAD83, zone 18. An aerial image of the site was used to determine source locations. The modeling methodology used for this analysis is described below. The following subsections describe the details of the modeling analysis.

3.1 Selection of Dispersion Model:

The latest version of the American Meteorological Society/Environmental Protection Agency Regulatory Model AERMOD was used. All standard regulatory default options of AERMOD were used.

To facilitate the implementation of AERMOD, the Lakes AERMOD View software was used.

3.2 Site Characterization:

The Albany Terminal is located at 50 Church Street in Albany, NY on the western bank of the Hudson River. The base elevation for the terminal is approximately 18 ft. Based on a land use analysis of the area surrounding the terminal and the latest guidance from NYSDEC in DAR-10, the surrounding area were considered rural in the air dispersion model.

3.3 Source Emissions:

3.3.1 Benzene Model

Total benzene emissions from the facility's PTE calculations were used for modeling. The PTE calculations were performed using the latest AP-42 methodology (June 2020). Tank emissions (standing and working) and tank landing and cleaning emissions were calculated using AP-42 calculation methods (AP-42 Chapter 7). Two (2) tanks are heated for biodiesel storage. Emissions were calculated as heated tanks per AP-42 (7.1 Organic Liquid Storage Tanks).

Transfer emissions are calculated using the standard AP-42 method for calculating rack transfers using maximum facility throughput values and design efficiency of the control device. Transfer fugitives use 99.2% capture efficiency factor when loading without vacuum assisted loading (AP-42 [5.2 Transportation and Marketing of Petroleum Liquids]).

Liquid weight concentrations for benzene for gasoline, crude, and distillate were based on speciation data from API 19.4. A benzene liquid weight concentration of 2% was used for blendstock. Vapor weight concentrations calculations for each month of the year were completed based on AP-42 Chapter 7 as part of the PTE. The benzene emissions were determined for each month of the year for each tank. The total benzene emissions for each tank for the worst-case product stored were used in the model.

The average annual benzene vapor weight percent based on monthly AP-42 meteorological data for Albany, NY was used for loading for each product. Gasoline was used as a worst-case for refined product loading as it has the highest vapor benzene concentration. The average annual blendstock benzene vapor weight concentration is used for blendstock loading. The average annual benzene vapor weight concentration for crude is used for crude loading calculations.

The attached tables summarize the parameters assumed for the modeling (Attachments 1 and 2). Detailed descriptions of the calculations, which were provided with the protocol, are also provided in Attachment 4. Detailed landing and cleaning calculations used for the hourly modeling for each tank have also been included in Attachment 4. Several different iterations representing different throughputs at each rack were completed to determine the impact on the model results.

3.3.1.1 Gasoline Storage Tanks:

The facility currently has ten (10) permitted petroleum product storage tanks. The tanks are equipped with internal floating roofs and have varying capacities. Each tank was modeled as two volume sources. One volume source was modeled with the actual tank height as the release height, which represented 80% of the emissions for the tank. The second volume source was modeled with half of the tank height as the release height, which represented 20% of the emissions for the tank. The diameter of the tank was used to calculate the initial lateral dimension by dividing the diameter by 4.3.

To determine the landing scenario that causes the worst-case short-term (1-hour) impact, landing emissions were evaluated for each tank separately in the short-term model. The tank with the worst-case estimate of emissions during landing based on the model results was then used to determine the maximum hourly emission rate of benzene during landings. Variable monthly emission rates were calculated and used in the model. These calculations are described in detail in Attachment 4.

Cleanings were also modeled, with the vapor space purge assumed to be the worst-case hour. The vapor space purge at each tank during cleaning was modeled as one volume source for each tank with the release height set to the height of the manway above the ground, which ranged from approximately 2.3 to 2.75 ft. The initial lateral dimension was calculated based on the diameter of the tank divided by 4.3. Uncontrolled vapor space purge was modeled for each tank. Model runs were completed for controlled cleanings (at 98% control). Controlled cleaning run assumptions assumed the use of a thermal oxidizer and were modeled as a horizontal point source. The controlled concentrations were calculated for the remaining tanks assuming 2% of the result obtained for the uncontrolled scenario. Detailed modeling parameters are provided in Attachment 1.

3.3.1.2 Distillate Storage Tanks:

The facility currently has five (5) exempt vertical fixed roof (VFR) distillate storage tanks with two (2) of those having the capability of being heated. Each VFR tank was modeled as a point source with the vent placed at the center of the tank. Detailed modeling parameters assumed for each tank are provided in Attachment 1.

3.3.1.3 Truck Loading Rack:

The facility has one (1) truck loading rack where gasoline, ethanol, and distillate are loaded. The truck rack has a refined product throughput subcap of 879,300,000 gallons per year. Loading operations are controlled with a VRU. The permitted emissions limit is 2 mg/L. The PTE calculation for the loading rack assumed maximum annual throughput of 879,300,000 gallons, controlled by the VRU. Loading rack fugitive emissions are controlled using a vac assist. Under an alternate operating scenario (AOS), loading can occur up to a lower throughput with fugitive emissions. Loading rack fugitive emissions were modeled as a volume source and controlled rack loading emissions from the VRU were modeled as a point source. Manufacturer information was used to develop source parameters such as stack height, stack diameter, stack temperature, and stack velocity. For the short term dispersion model, the truck loading rack was assumed to load gasoline at the maximum loading rate as this is the worst case scenario product. Modeling was conducted for the primary and alternate operating scenarios. The model runs completed, including loading assumptions and emissions rates, are summarized in Attachment 2.

3.3.1.4 Rail Loading:

The facility has one (1) rail loading area where gasoline, ethanol, distillate, and biodiesel are loaded. The rail rack has a proposed refined product throughput subcap of 300,000,000 gallons. Loading operations are controlled with a VCU. The permitted emissions limit will be 2 mg/L. The PTE calculation for the loading rack assumed maximum annual throughput for each product loaded, controlled by the VCU. The controlled loading emissions were modeled as a point source. Rail loading fugitive emissions will be controlled using a vac assist. Under an AOS, loading can occur up to a lower throughput with fugitive emissions. Rail rack fugitive emissions, which used 99.2% capture efficiency, were modeled as a volume source. Manufacturer information was used to develop source parameters such as stack height, stack diameter, stack temperature, and stack velocity. For the short term dispersion model, the rail loading is assumed to load gasoline at the maximum loading rate as this is the worst case scenario product. Modeling was conducted for the primary and alternate operating scenarios. The model runs completed, including loading assumptions and emissions rates, are summarized in Attachment 2.

3.3.1.5 Marine Loading:

The facility has one (1) marine loading rack where refined products (gasoline, ethanol, blendstock, distillate, and biodiesel) and crude oil are loaded. The marine dock has a proposed refined product subcap throughput of 900,000,000 gallons and a reduced crude throughput cap of 450,000,000 gallons. Loading operations are controlled by two VCUs. The PTE calculation for the loading rack assumed maximum annual throughput for each product loaded, controlled by two VCUs (VCUM1 at 10 mg/L and VCUM2 at 2 mg/L). Marine loading fugitive emissions will be controlled unless loading under an AOS for inerted vessels using VCUM2. Loading can occur up to a lower throughput with fugitive emissions, assuming 99.9% capture efficiency. Fugitive emissions were modeled as an elevated area source and controlled rack landing emissions were modeled as a point source. Manufacturer information was used to develop source parameters such as stack height, stack diameter, stack temperature, and stack velocity for each VCU. For the short term dispersion model, the marine loading was assumed to load gasoline at the maximum loading rack as this is the worst case scenario product. Modeling was conducted for the primary and alternate operating scenarios. The model runs completed, including loading assumptions and emissions rates, are summarized in Attachment 2.

3.3.2 Non-HTAC Modeling

Hourly Emission Rate Potentials (ERP) were calculated for each of the emission sources at the facility for the following non-HTACs, for which actual annual emissions were greater than 100 lb/yr:

- Hexane
- 2,2,4-TMP
- Toluene
- Ethylbenzene
- Xylenes

The calculated hourly ERPs for the non-HTACs listed above were provided in the model protocol. Modeling was completed for each of the non-HTACs in the hourly ERP evaluation to determine the final Environmental Rating (ER) for each non-HTAC. The initial ERs, based on toxicity alone, are B for hexane, 2,2,4-TMP, ethylbenzene, and xylene and C for toluene.

Emission rates from each source were calculated using the same methodology as for benzene, which is outlined in Attachment 4, with the speciation for each non-HTAC used instead of the speciation for benzene. The worst-case speciation for each non-HTAC at each source was used in the modeling, depending on the product loaded. For hourly emissions for the tanks, the speciation for the product being modeled for the landing or cleaning (gasoline or blendstock) for each month was used to calculate the variable emission rates. The emission rates used in the model are provided in Attachments 1 and 2.

Table 1 below summarizes the AGCs and SGCs for the non-HTACs included in this analysis.

Table 1. AGCs and SGCs for non-HTACs.

Non-HTAC	AGC (ug/m^3)	SGC (ug/m^3)
hexane	700	NA
2,2,4-TMP	3,300	NA
toluene	5,000	37,000
ethylbenzene	1,000	NA
xylenes	100	22,000

3.3.3 H_2S Model

Modeling was completed for potential H_2S emissions for each of the IFR tanks storing crude oil. A separate table of the parameters used in the annual model is provided (Attachment 3). Each tank was modeled as two volume sources. One volume source was modeled with the actual tank height as the release height, which represented 80% of the emissions for the tank. The second volume source was modeled with half of the tank height as the release height, which represented 20% of the emissions for the tank. The diameter of the tank was used to calculate the initial lateral dimension by dividing the diameter by 4.3.

Modeling was completed for both annual emissions and hourly emission rates, assuming a vapor fraction of 0.00118, which is based on a liquid H_2S content of 10 ppm. For the annual model, the H_2S vapor fraction was multiplied by the total standing and working losses from crude oil storage in each tank and landing emissions, assuming one landing per tank.

For the hourly model, the H_2S vapor fraction was multiplied by the emission rate for the worst case hour during refill after landing or during vapor space purge during cleaning. Four hourly model iterations were completed during refill after landing. Model iterations were completed assuming that Tank 32 and Tank 117 were landing separately both with and without marine fugitives as a comparison. These tanks were chosen because they were the worst-case results for gasoline and blendstock tanks in the benzene

modeling for refill after a landing. Variable emission rates were also used for each month for the hourly model.
Model iterations were also completed for vapor space purge during cleaning. Uncontrolled vapor space purge was modeled for tanks 32 and 121 with marine fugitives. These tanks were chosen because they were the worst-case results for gasoline and blendstock tanks in the benzene modeling for vapor space purge during cleaning. Controlled vapor space purge concentrations were calculated by taking 2% of the uncontrolled model results for each tank. Additional details on H_2S model runs are provided in Attachments 3 and 6.

Annual model results were compared to the AGC for H_2S of 2 $\mu g/m^3$. Hourly model results were compared to the NYS H_2S standard of 0.01 ppm for 1-hour (14 $\mu g/m^3$).

3.4 Building Downwash Analysis:

All of the storage tanks at the facility, as well as office buildings, were utilized in the building downwash analysis. Direction-specific building dimensions were generated using BPIP-PRIME.

3.5 Meteorological Data:

Meteorological data which has been pre-processed for AERMOD for the years 2016-2020 were obtained from NYSDEC. Surface Met Data and Upper Air Met Data is from the Station located at the Albany International Airport in Colonie, NY located approximately 8 miles northwest of the terminal. This station was chosen because of its close proximity to the Terminal.

3.6 Modeled Receptors

Boundary receptors were modeled at the property lines from the facility site plan. Receptors were located every 25 meters along the facility boundaries. A Cartesian receptor grid was used to monitor the area surrounding the facility, using the following spacing:

- 70 meter spacing from the facility boundary out to 1 km
- 100 meter spacing from 1 to 2 km
- 250 meter spacing from 2 to 5 km
- 500 meter spacing from 5 to 10 km

Given the low emission release heights and the near ambient release temperatures it is not anticipated that significant emissions will be carried beyond these receptor points.

3.7 Terrain Considerations

The effects of terrain were considered in the modeling analysis. Elevations (above mean sea level) corresponding to the base elevation of the facility were assigned to all sources and buildings at the facility, as well as the modeled receptors.

The terrain processor for AERMOD, AERMAP, was used to generate terrain maxima (also referred to as hill heights) for the sources, buildings, and receptors. To generate these terrain maxima, object locations and Digital Elevation Model (DEM) data in 1 degree format were input to AERMAP.

4.0 Model Results

Detailed model results for each run are provided in Attachment 5 for benzene and non-HTACs and in Attachment 6 for H_2S. The maximum concentrations at the property line are summarized in the following sections.

4.1 Benzene Model Results

Annual model results ranged from 0.24 µg/m^3 to 0.29 µg/m^3 when the range of operating scenarios was explored in different model iterations, which exceeds the AGC of 0.13 µg/m^3. However, this result is below the 10-in-a-million cancer risk level, which is identified as the acceptable residual risk management range in DAR-1 Section F.1(c).

The results of the hourly model runs are summarized in Table 2 below. The range of concentrations is provided for each scenario. Detailed results are in Attachment 5.

Table 2. Benzene Hourly Model Results Summary.

Scenario Modeled	**Range of Benzene Results for Maximum 1-hr at the Fenceline (µg/m^3)**
No Cleanings or Landings	28.0 µg/m3
Refill after a landing	88.1 µg/m^3 to 220.1 µg/m^3
Uncontrolled vapor space purge	3,110.2 µg/m^3 to 30,660.2 µg/m^3
Vapor space purge, 98% control	18.8 µg/m^3 to 70.7 µg/m^3

The results exceed the SGC of 27 µg/m^3 for all of the uncontrolled scenarios. For controlled vapor space purge, two tanks (tanks 119 and 120) pass for all months of the year.

4.2 Non-HTAC Model Results

Annual model results were significantly below the AGCs for all of the non-HTACs, which can be seen in the detailed results in Attachment 5.

Only xylenes and toluene were included in the hourly modeling because SGCs are provided for these non-HTACs.

The results of the hourly model runs are summarized in Table 3 below. The range of concentrations is provided for each scenario. Detailed results are in Attachment 5.

Table 3. Xylene and Toluene Hourly Model Results Summary.

Scenario Modeled	**Range of Xylene Results for Maximum 1-hr at the Fenceline (μg/m^3)**	**Range of Toluene Results for Maximum 1-hr at the Fenceline (μg/m^3)**
No Cleanings or Landings	344.8 μg/m^3	144.9 μg/m^3
Refill after a landing	345.8 μg/m^3 to 346 μg/m^3	148.1 μg/m^3 to 252.2 μg/m^3
Uncontrolled vapor space purge	1,068.7 μg/m^3 to 9,105.9 μg/m^3	3,550.2 μg/m^3 to 33,752.2 μg/m^3
Vapor space purge, 98% control	52.8 μg/m^3 to 60.7 μg/m^3	29.3 μg/m^3 to 79.9 μg/m^3

No exceedances of the SGC for xylene (22,000 μg/m^3) or toluene (37,000 μg/m^3) were observed in the hourly modeling results.

4.3 H_2S Model Results

Detailed H_2S model results are provided in Attachment 6. There were no exceedances of the AGC in the annual model results. Runs were completed with and without marine fugitives (crude loading is only permitted at the marine dock)

As discussed in Section 3.3.3, model iterations were completed for refill after a landing and uncontrolled vapor space purge during cleaning with marine fugitives, Controlled vapor space purge during cleaning was calculated by taking 2% of the uncontrolled results for each tank. There were no differences observed in the model results with and without fugitives. The following results were obtained:

- No cleanings or landings: result was 0.84 μg/m^3
- Refill after a tank landing: results were 58.9 μg/m^3 and 52.3 μg/m^3 for Tanks 32 and 117, respectively
- Uncontrolled vapor space purge: results were 7,455.1 μg/m^3 and 7,127 μg/m^3 for Tanks 32 and 121, respectively
- Controlled vapor space purge: results were 149.1 μg/m^3 and 142.5 μg/m^3 for Tanks 32 and 121, respectively

The hourly model runs exceeded the NYS H2S standard of 14 μg/m^3 for 1 hour.

5.0 TBACT Analysis

As per 6 NYCRR 212-1.5, "in instances where a facility owner or operator can demonstrate to the satisfaction of the department that the facility owner or operator will apply BACT for criteria air contaminants or T-BACT for non-criteria air contaminants, the department may specify a less restrictive permissible emission rate or degree of air cleaning for the process emission source or emission point than required under Subpart 212-2 of this Part." 6 NYCRR 212-1.2(b)(20) defines T-BACT as "the maximum degree of reduction or the emission limitation for each non-criteria air contaminant that the department determines is achievable for a process operation on a case-by-case basis." The Terminal meets T-BACT as outlined below for the loading rack and tank emissions from standing and working losses. The Terminal is proposing to implement T-BACT for tank cleanings.

The EPA RACT/BACT/LAER Clearinghouse was used for this evaluation as well as BACT determinations from several state agencies. State and Federal regulations were also reviewed. Specifically, Texas, New Jersey and Massachusetts were used in this evaluation. Each of these states have regulations and/or BACT determinations that addressed the three areas of emissions evaluated – loading rack emissions, Internal Floating Roof (IFR) tank losses from routine operations and IFR tank losses from maintenance emissions (landings and cleanings). The Texas Commission on Environmental Quality (TCEQ) Tier 1 BACT Requirements were used as well as Massachusetts Department of Environmental Protection (MassDEP) Top Case Best Available Control Technology (BACT) Guidelines for VOC Emitting Sources. New Jersey "advances in the art of air pollution control" requirements, commonly referred to as "State-of-the-Art" or "SOTA" were reviewed along with the NJ Reasonably Available Control Technology (RACT) regulations.

5.1 Loading Emissions

For loading emissions, BACT has been identified by TCEQ as 10 mg VOC/liter of gasoline loaded. NJ SOTA performance level for transfer operations for truck terminal and marine vessel operations is 10 mg VOC/liter of liquid transferred. MA defines BACT as 2 mg/L with a Vacuum Assist, negative pressure (VANP) vapor collection system with 100% collection efficiency with the installation and operation of CEMS. However, this is often considered Lowest Achievable Emission Rate (LAER) as opposed to BACT. Federal MACT regulations (Subpart R) require 10 mg/L while area source NESHAPS (Subpart BBBBBB) require 80 mg/L and NSPS Subpart XX requires 35 mg/L. The Global Terminal currently has a limit of 2 mg/L for the truck rack VRU with vacuum assisted loading. This exceeds BACT requirements.

5.2 Storage Tanks

For IFR tanks storing products with a true vapor pressure (TVP) <11.0 psia, TCEQ BACT requires storage tanks that have uninsulated exterior surfaces exposed to the sun to be white or aluminum. Required seals are either a primary mechanical or liquid mounted seal, or alternatively, a primary vapor mounted seal and secondary rim mounted seal. NJ requires a tank to have a floating roof with floating roof configurations that are similar to New Source Performance Standard (NSPS - 40 CFR Part 60 Subpart Kb), except with additional seal gap and fitting closure requirements, including leg socks, and allowing no visible gaps. MA requirements are specified in Regulations 310 CMR 7.24, which are consistent with 40 CFR 60 Subpart Kb. In addition, all new tanks are to be equipped with cable suspended full contact floating roofs (leg-supported floating roofs shall not be allowed). Federal regulations, specifically Subpart Kb, are consistent with BACT requirements. MACT Subpart R also requires that Kb requirements are met. GDGACT regulations require a modified Kb for tanks (secondary seal on a primary wiper seal is not required) not subject to Kb regulations or WW which has similar requirements to Kb. Global tanks meet federal regulations, including Subpart Kb requirements for Kb applicable tanks and GDGACT for non-Kb applicable tanks.

5.3 Tank Cleanings and Landings

Currently, there is no level of control provided for maintenance emissions (landings or cleanings) at the Terminal, as they have not been previously required to control emissions from these activities based on short term modeling. With the new short term modeling limits in NY, landings and cleanings now exceed the SGC for benzene. Therefore, T-BACT was evaluated specifically related to landing and cleaning emissions from the IFR storage tanks. A summary of TX, NJ and MA regulations and/or BACT determinations specific to landings/clearings are outlined below.

5.3.1 Texas Regulatory Summary

TCEQ regulations pertaining to VOC storage tanks are outlined in Chapter 115 - Control of Air Pollution from Volatile Organic Compounds, Subchapter F: Miscellaneous Industrial Sources, Division 3: Degassing of Storage Tanks, Transport Vessels, and Marine Vessels §§115.540 - 115.542, 115.543, 115.544, 115.545, 115.546, 115.547, 115.549.

Per §115.541, all VOC vapors from a storage tank must be routed to a control during degassing operations unless the VOC concentration is less than 34,000 parts per million by volume (ppmv) expressed as methane or 50% of the lower explosive limit. In addition, all VOC vapors from a floating roof storage tank that is not a drain-dry tank must be routed to a control device as soon as practical but no later than:

(1) 24 hours after the tank has been emptied to the extent practical or the drain pump loses suction for a floating roof storage tank containing VOC liquids with a true vapor pressure greater than or equal to 1.5 pounds per square inch absolute (psia) under actual storage conditions;

(2) 72 hours after the tank has been emptied to the extent practical or the drain pump loses suction for a floating roof storage tank containing VOC liquids with a true vapor pressure less than 1.5 psia under actual storage conditions; or.

(3) the time limit specified in a permit issued under Chapter 116 of this title (relating to Control of Air Pollution by Permits for New Construction or Modification) up to a maximum of 72 hours after the tank has been emptied to the extent practical or the drain pump loses suction.

TCEQ Tier 1 BACT is defined for cleanings and landings as follows:

- **Cleanings**: “route to appropriate control device when degassing. Control must be maintained until the VOC concentration is less than 10,000 ppmv VOC (or equivalent for non-VOCs). If there is any standing liquid within the tank, and the tank is opened to the atmosphere or ventilated, the vapor stream must be controlled until there is no standing liquid or the VOC vapor pressure is less than 0.02 psia. Route to control device during roof refloating if emissions from filling tanks without degassing and cleaning is > 5tpy. In this case, if controlling through fixed roof vent, route to control device during entire tank refill. New tanks must be designed to be drain dry with connections to control vapors under a landed roof. Commence under-roof degassing within 24 hours of landing. Degas every 24 hours unless no standing liquid in tank or vapor pressure of liquid in tank has a VOC partial pressure <0.02 psi."

- **Floating roof tank landings at bulk gasoline terminals**:
  - "May land roof without control for two landings per tank per year when required for Reid Vapor Pressure changes.
  - Floating roof tank landing, change of service: May land roof without control for a change of service (incompatible liquids) if total site change of service tank landing emissions are less than 5 tpy."

For control requirements, TCEQ defines BACT for a flare for VOCs as meeting 40 CFR 60.18 and having a destruction efficiency of 99% for certain compounds up to three carbons and 98% otherwise. No flaring of halogenated compounds is allowed.

5.3.2 New Jersey Regulatory Summary

N.J. Admin Code § 7:27-16.2(p) states the following requirements for VOC stationary storage tanks:

"(p) The owner or operator of any floating roof tank, not exempt pursuant to (f)6 or (f)7 above, used to store a VOC shall:

1. Submit a complete facility-wide tank VOC control plan to the Department for approval at the address listed at (v) below as follows:
   - i. For any floating roof tank not exempt pursuant to (f)6 above, and existing as of May 19, 2009, submit to the Department in writing the complete facility-wide tank VOC control plan by December 1, 2009; or
   - ii. For any new tank, excluding a tank exempt pursuant to (f)6 above, added to a facility, submit to the Department in writing a new or updated complete facility-wide tank VOC control plan by 120 days after the installation of the newly constructed tank(s);
2. Include in the facility-wide tank VOC control plan, for all floating roof tanks, except those floating roof tanks exempt pursuant to (f)6 above, the information in (p)2i and ii below or (p)2i and iii below, as applicable:
   - i. A list of each tank at the facility and the following for each tank:
     - (1) The tank type;
     - (2) The tank volume;
     - (3) The tank diameter;
     - (4) The tank contents;
     - (5) The permit activity number;
     - (6) Any other identifying numbers; and
     - (7) The Bureau of Release Prevention schedule for tank inspection.
   - ii. A schedule to implement one or more of the following emission controls, which must be implemented by May 19, 2019. This schedule shall be consistent with the facility's

schedule for tank removal from service for normal inspection and maintenance and with the facility's schedule for the installation of any new tank(s):

(1) A tank configuration such that the bottom of the roof deck can be lowered to one foot or less from the top-most point of the surface of the tank floor;

(2) A method that routes all vapors from the tank to a vapor control device with a control efficiency of at least 90 percent, from the time the roof is landed until it is within 10 percent by volume of being refloated; or

(3) Other measures approved by the Department as being equally or more effective in preventing VOC emissions to the outdoor atmosphere."

iii. An emissions averaging plan to operate all Range III floating roof tanks that store gasoline, except those tanks exempt pursuant to (f)6 above, such that their average annual in-service roof landing VOC emissions, as calculated in accordance with Chapter 7.1.3.2.2 "Roof Landings" of AP-42, as supplemented or amended and incorporated herein by reference, or as calculated using another method approved by the Department in accordance with (v) below, and after applying any applicable control efficiencies, is less than:

(1) Five tons per tank per calendar year from 2011 through 2013;
(2) Four tons per tank per calendar year from 2014 through 2016;
(3) Three tons per tank per calendar year from 2017 through 2019; and
(4) Two tons per tank per calendar year in 2020 and subsequent years.

(f) The following exemptions apply:

6. Any floating roof tank subject to a Federally enforceable condition limiting its annual in-service roof landing VOC emissions to less than five tons as calculated by AP-42, Chapter 7, may be exempt from (p) below, at the owner or operator's discretion, provided that the owner or operator shall maintain the records of these calculations pursuant to (s) below and the tank's Operating Permit or Preconstruction Permit, as applicable.
7. Any floating roof tank subject to a Federally enforceable condition in its Operating Permit or Preconstruction Permit, as applicable, limiting the vapor pressure of its contents to less than 1.5 psia at standard conditions, shall be exempt from (p) below only if the tank's records, maintained pursuant to (s)1 below, show that the vapor pressure of the tank's contents is less than 1.5 psia under standard conditions."

NJ requires control of cleanings in ozone season, between May 1 to September 30 per N.J. Admin. Code § 7:27-16.2(q):

"(q) On and after May 1, 2010, any part of a degassing and cleaning operation of a stationary storage tank performed during the period May 1 through September 30 shall be performed only as follows:

1. The owner or operator shall degas a tank storing a VOC with a vapor pressure equal to or greater than 0.5 psia at standard conditions as follows:
   i. Empty the tank of the VOC liquid;

ii. Minimize VOC vapors in the tank vapor space by one of the following methods:

(1) Exhaust VOCs contained in the tank vapor space to a vapor control system rated at a minimum 95 percent efficiency until the organic vapor concentration is 5,000 parts per million by volume (ppmv) or less as methane, or is 10 percent or less of the lower explosive limit, whichever is less;

(2) Displace VOCs contained in the tank vapor space to a vapor control system rated at a minimum 95 percent efficiency by filling the tank with a suitable liquid until 90 percent or more of the maximum operating level of the tank is filled. Suitable liquids are organic liquids having a TVP of less than 0.5 psia, water, clean produced water, or produced water derived from crude oil having a TVP less than 0.5 psia; or

(3) If the tank is a free-water knockout tank, a person may degas the tank vapor space by restricting the outflow of water and floating off the oilpad, such that at least 90 percent of the tank volume is displaced;

iii. Discharge or displace the VOC vapors contained in the tank vapor space to a vapor control system that is vapor-tight and free of liquid leaks; and

iv. As appropriate, temporarily remove for no longer than one hour, a suitable tank fitting, such as a manway, to facilitate connection to an external vapor control system.

2. The owner or operator shall clean a tank storing a VOC with vapor pressure equal to or greater than 0.5 psia at standard conditions only if:

i. At least one of the following cleaning agents is used:

(1) Diesel fuel;
(2) A solvent with an initial boiling point of greater than 302 degrees Fahrenheit;
(3) A solvent with a vapor pressure less than 0.5 psia;
(4) A solvent with 50 grams per liter VOC content or less; or
(5) Some other Department-approved cleaning agent; or

ii. Steam cleaning is performed.

3. The owner or operator shall control emissions from the sludge removed from a tank that stores a VOC with a vapor pressure equal to or greater than 1.5 psia at standard conditions by:

i. During sludge removal, controlling emissions from the receiving vessel by operating a vapor control system that reduces VOC emissions by at least 95 percent;

ii. Transporting removed sludge in containers that are vapor-tight and free of liquid leaks; and

iii. Storing removed sludge, until final disposal, in containers that are vapor-tight and free of liquid leaks, or in tanks that comply with (b) above."

NJ does not have a regulation requiring landings to be controlled unless you need it to comply with the emissions levels outlined in § 7:27-16.2(p)iii. above. However, control of landings is being required on a case by case basis depending on hourly air dispersion modeling results. Required control for cleanings during ozone season is 95%.

5.3.3 Massachusetts Regulatory Summary

There are no regulations specific to maintenance emissions for organic material storage and distribution per 310 CMR 7.24.

MassDEP Top Case BACT Guidelines for Bulk Gasoline Storage Tanks state the following minimum requirements for VOCs:

"In addition to requirements specified in Regulations 310 CMR 7.24 and 40 CFR 60 Subpart Kb

- All tanks shall be equipped with cable suspended full contact floating roofs (leg-supported floating roofs shall not be allowed)
- Tanks designed such that there will be no standing liquid when emptied
- Tanks must include a connection for a control device (98% VOC/HAPs control efficiency or 5000 ppmv VOC/HAPs tank concentration) that will control vapors when roofs are not floating (when tanks are emptied, cleaned, during seasonal fuel switching/tank landings, etc.)
- Utilize 98% overall efficiency VOC/HAPs control device when seasonal fuel switching/tank landing event would cause potential VOC/HAPs emission of one or more tons."

Control is required when landing emissions are greater than 1 ton. The required control is 98%.

5.4 Conclusion

The truck rack VRU at the Global Albany Terminal is considered LAER as outlined in Section 5.1. The IFR tanks at the Terminal are in compliance with T-BACT requirements outlined in Section 5.2.

Based on the regulatory review provided in Section 5.3, controlled cleanings could be considered BACT. Although control is often required only during ozone season, some states are requiring controlled cleanings all year. BACT control efficiency is between 95%-98%. Landing emissions are not typically controlled and therefore not considered BACT.

Attachment 1

Modeling Parameters for Tanks

Global Albany Annual Benzene Model Assumptions - TANKS

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Emission Rate (lb/yr)	From PTE Calculations	5.77
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Emission Rate (lb/yr)	From PTE Calculations	5.77
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Emission Rate (lb/yr)	From PTE Calculations	5.77
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.55E-04
Emission Rate (lb/yr)	From PTE Calculations	5.74
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	5.40E-04
Emission Rate (lb/yr)	From PTE Calculations	4.73
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

Global Albany Annual Benzene Model Assumptions - TANKS

Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.65E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	66.99
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.87E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	42.66
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.91E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	16.75
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.22E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	10.67
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.65E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	67.00
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.87E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	42.68
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.91E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	16.75
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.22E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	10.67
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

Global Albany Annual Benzene Model Assumptions - TANKS

Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.63E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	58.11
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	3.86E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	33.78
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.66E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	14.53
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	9.64E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	8.45
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.51E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	48.29
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	2.74E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	23.97
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.38E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	12.07
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	6.84E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	5.99
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Benzene Model Assumptions - TANKS

Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.09E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	62.08
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.94E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	78.29
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.77E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	15.52
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.23E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	19.57
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	8.79E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	76.96
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.06E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	93.18
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.20E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	19.24
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.66E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	23.29
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Benzene Model Assumptions - TANKS

Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.47E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	47.94
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.32E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	64.15
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.37E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	11.98
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.83E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	16.04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.54E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	66.06
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	9.39E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	82.27
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.89E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	16.51
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.35E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	20.57
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Benzene Model Assumptions - TANKS

Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.99E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	70.00
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	9.84E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	86.21
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.00E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	17.50
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.46E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	21.55
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.21E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	105.60
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.39E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	121.82
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	3.01E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	26.40
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.48E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	30.45
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Benzene Model Assumptions - TANKS

Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	3.04E-03
Emission Rate (lb/yr)	From PTE Calculations	26.62
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	7.60E-04
Emission Rate (lb/yr)	From PTE Calculations	6.65
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Benzene Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

General Parameters	
Parameter	**Value**
Projection	**UTM**
Datum	NAD83
UTM Zone	18
Hemisphere	Northern
AERMET	2016-2020 MET Data
AERMAP	1-deg DEM Data from webgis.com

Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.55E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	5.40E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.65E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93

Global Albany Hourly Benzene Model Assumptions - TANKS

Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	5.51E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.38E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.09E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.77E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	8.79E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

Global Albany Hourly Benzene Model Assumptions - TANKS

Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.20E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	5.47E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.37E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.54E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.89E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Benzene Model Assumptions - TANKS

Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.99E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.00E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.21E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	3.01E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Benzene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	3.04E-03
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	7.60E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Benzene Model Assumptions - Vapor Space Purge During Tank Cleaning

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 29 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 30 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 33 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 64 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 31 (Gasoline) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16
Tank 31 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 32 (Gasoline) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.75
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.30
Tank 32 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 39 (Gasoline) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.54
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.18

Global Albany Hourly Benzene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 39 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 120 (Gasoline) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.58
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.20
Tank 120 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 114 (Blendstock) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.71
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.26
Tank 114 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 115 (Blendstock) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.33
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.10
Tank 115 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400

Global Albany Hourly Benzene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 117 (Blendstock) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.20
Tank 117 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 118 (Blendstock) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.42
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.12
Tank 118 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 119 (Blendstock) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.38
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.10
Tank 119 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 121 (Blendstock) (During Uncontrolled Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16

Global Albany Hourly Benzene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 119 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Benzene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
See Hourly Assumptions Table		
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
See Hourly Assumptions Table		

Variable Emission Rate Calculations for Benzene Modeling

		Ratios Used for Variable Emission Rates[1]												July Benzene Emission Rates[2]		
Tank	**Product Assumed**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Refill after landing (lb/hr)**	**Uncontrolled Vapor Space Purge (lb/hr)**	**Controlled Vapor Space Purge (lb/hr)**
31	Gasoline - PTE RVP schedule	0.277	0.300	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.454	0.329	1.35	16.44	0.3288
32	Gasoline - PTE RVP schedule	0.277	0.300	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.454	0.329	1.35	16.44	0.3288
39	Gasoline - PTE RVP schedule	0.277	0.300	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.454	0.329	1.35	16.44	0.3288
120	Gasoline - PTE RVP schedule	0.277	0.300	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.454	0.329	1.35	6.74	0.1348
114	Blendstock RVP 15	0.266	0.288	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.435	0.316	1.56	17.6	0.352
115	Blendstock RVP 15	0.266	0.288	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.435	0.316	1.57	27.5	0.55
117	Component RVP 14.33	0.266	0.288	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.435	0.316	1.5	14.2	0.284
118	Component RVP 14.33	0.266	0.288	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.435	0.316	1.5	11.7	0.234
119	Component RVP 14.33	0.266	0.288	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.435	0.316	1.5	7.48	0.1496
121	Blendstock RVP 15	0.266	0.288	0.377	0.539	0.713	0.908	1.000	0.971	0.793	0.574	0.435	0.316	1.57	27.45	0.549

Notes

1. The ratio was calculated and used as follows:
    - Landing or cleaning total VOC emissions were calculated for each month.
    - The benzene emissions for each month were calculated based on the speciation for that month for the given product.
    - The ratio used for variable emission rate factors in AERMOD was calculated by dividing the benzene emission rate for a given month by the July benzene emission rate.
    - The July benzene emission rate was then entered as the emission rate for the source in the Source inputs screen in AERMOD View.
2. Emission rates represent the total benzene emissions for the tank. For landings, 80% of that value was at a release height at the top of the tank. The remaining 20% was at half of the tank height.
For vapor space purge, all of the emissions were placed at the height of the manway.

Global Albany Annual Hexane Model Assumptions - TANKS

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.34E-04
Emission Rate (lb/yr)	From PTE Calculations	1.17
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.34E-04
Emission Rate (lb/yr)	From PTE Calculations	1.17
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.34E-04
Emission Rate (lb/yr)	From PTE Calculations	1.17
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.32E-04
Emission Rate (lb/yr)	From PTE Calculations	1.16
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.10E-04
Emission Rate (lb/yr)	From PTE Calculations	0.96
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

Global Albany Annual Hexane Model Assumptions - TANKS

Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.62E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	58.02
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.16E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	36.44
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.66E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	14.50
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.04E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	9.11
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.62E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	58.03
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.16E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	36.45
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.66E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	14.51
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.04E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	9.11
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

Global Albany Annual Hexane Model Assumptions - TANKS

Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.76E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	50.42
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	3.29E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	28.84
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.44E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	12.60
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	8.23E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	7.21
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.81E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	42.10
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	2.34E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	20.52
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.20E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	10.52
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	5.86E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	5.13
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Hexane Model Assumptions - TANKS

Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.07E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	531.58
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.59E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	664.70
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.52E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	132.89
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.90E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	166.18
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.81E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	683.74
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	9.32E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	816.86
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.95E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	170.93
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.33E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	204.22
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Hexane Model Assumptions - TANKS

Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.54E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	397.52
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.06E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	530.65
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.13E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	99.38
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.51E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	132.66
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.91E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	604.99
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.43E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	738.12
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.73E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	151.25
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.11E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	184.53
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.51E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	657.63
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	9.03E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	790.76
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.88E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	164.41
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.26E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	197.69
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.15E-01
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1005.07
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.30E-01
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1138.19
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.87E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	251.27
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.25E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	284.55
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	2.75E-03
Emission Rate (lb/yr)	From PTE Calculations	24.06
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	6.87E-04
Emission Rate (lb/yr)	From PTE Calculations	6.01
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	0.00
Emission Rate (lb/yr)	From PTE Calculations	0.00
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	0.00
Emission Rate (lb/yr)	From PTE Calculations	0.00
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	0.00
Emission Rate (lb/yr)	From PTE Calculations	0.00
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	0.00
Emission Rate (lb/yr)	From PTE Calculations	0.00
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	0.00
Emission Rate (lb/yr)	From PTE Calculations	0.00
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

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Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	9.10E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	79.69
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	5.91E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	51.74
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.27E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	19.92
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.48E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	12.94
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	9.10E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	79.69
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	5.91E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	51.74
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.27E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	19.92
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.48E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	12.94
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1

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Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

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Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.86E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	68.85
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.67E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	40.90
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.96E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	17.21
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.17E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	10.23
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.50E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	56.93
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	3.31E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	28.98
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.62E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	14.23
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	8.27E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	7.25
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6

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Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	8.34E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	73.03
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.05E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	91.66
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.08E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	18.26
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.62E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	22.92
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.01E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	88.58
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.22E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	107.21
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.53E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	22.15
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.06E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	26.80
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9

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Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.44E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	56.43
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.57E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	75.06
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.61E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	14.11
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.14E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	18.77
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	8.54E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	74.85
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.07E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	93.49
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.14E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	18.71
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.67E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	23.37
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3

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Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	8.95E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	78.40
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.11E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	97.03
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.24E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	19.60
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.77E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	24.26
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.36E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	118.99
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.57E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	137.62
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	3.40E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	29.75
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.93E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	34.41
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9

Global Albany Annual 2,2,4-TMP Model Assumptions - TANKS

Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual 2,2,4-TMP Model Assumptions - TANKS

Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	3.45E-03
Emission Rate (lb/yr)	From PTE Calculations	30.25
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	8.63E-04
Emission Rate (lb/yr)	From PTE Calculations	7.56
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Xylenes Model Assumptions - TANKS

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.94E-02
Emission Rate (lb/yr)	From PTE Calculations	169.76
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.94E-02
Emission Rate (lb/yr)	From PTE Calculations	169.76
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.94E-02
Emission Rate (lb/yr)	From PTE Calculations	169.76
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.93E-02
Emission Rate (lb/yr)	From PTE Calculations	169.06
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.55E-02
Emission Rate (lb/yr)	From PTE Calculations	135.47
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

Global Albany Annual Xylenes Model Assumptions - TANKS

Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.83E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	247.63
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.13E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	36.15
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.07E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	61.91
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.03E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	9.04
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.83E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	247.67
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	4.13E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	36.19
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.07E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	61.92
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.03E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	9.05
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

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Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.73E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	239.19
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	3.16E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	27.71
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.83E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	59.80
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	7.91E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	6.93
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.64E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	231.31
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	2.26E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	19.83
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.60E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	57.83
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	5.66E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	4.96
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.88E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	252.23
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	4.49E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	393.22
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.20E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	63.06
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.12E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	98.31
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.96E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	259.16
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	4.57E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	400.15
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.40E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	64.79
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.14E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	100.04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.73E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	239.47
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	4.34E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	380.45
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.83E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	59.87
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.09E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	95.11
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.77E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	242.81
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	4.38E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	383.80
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.93E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	60.70
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.10E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	95.95
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.76E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	241.84
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	4.37E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	382.83
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.90E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	60.46
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.09E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	95.71
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	3.09E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	270.26
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	4.69E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	411.25
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.71E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	67.56
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	1.17E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	102.81
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	9.56E-04
Emission Rate (lb/yr)	From PTE Calculations	8.38
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	2.39E-04
Emission Rate (lb/yr)	From PTE Calculations	2.09
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Xylenes Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.94E-02
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.94E-02
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.94E-02
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.93E-02
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.55E-02
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

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See Separate Table for Vapor Space Purge During Cleanings

Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.83E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.07E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.83E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.07E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.73E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93

Global Albany Hourly Xylenes Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.83E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.64E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.60E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.88E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.20E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Xylenes Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.96E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.40E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.73E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.83E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.77E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

Global Albany Hourly Xylenes Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.93E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.76E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.90E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	3.09E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	7.71E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Xylene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Xylenes Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	9.56E-04
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	2.39E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Xylenes Model Assumptions - Vapor Space Purge During Tank Cleaning

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 29 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 30 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 33 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 64 (Distillate) (Point Source)		
	See Hourly Assumptions Table	
Tank 31 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16
Tank 31 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 32 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.75
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.30
Tank 32 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 39 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.54
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.18
Tank 39 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400

Global Albany Hourly Xylenes Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 120 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.58
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.20
Tank 120 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 114 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.71
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.26
Tank 114 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 115 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.33
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.10
Tank 115 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 117 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.20
Tank 117 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400

Global Albany Hourly Xylenes Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 118 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.42
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.12
Tank 118 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 119 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.38
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.10
Tank 119 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 121 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Xylene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16
Tank 121 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for xylene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
See Hourly Assumptions Table		
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
See Hourly Assumptions Table		

Variable Emission Rate Calculations for Xylene Modeling

		Ratios Used for Variable Emission Rates[1]												July Xylene Emission Rates[2]		
Tank	**Product Assumed**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Refill after landing (lb/hr)**	**Uncontrolled Vapor Space Purge (lb/hr)**	**Controlled Vapor Space Purge (lb/hr)**
31	Gasoline - PTE RVP schedule	0.189	0.209	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.357	0.236	0.44	5.37	0.1074
32	Gasoline - PTE RVP schedule	0.189	0.209	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.357	0.236	0.44	5.37	0.1074
39	Gasoline - PTE RVP schedule	0.189	0.209	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.357	0.236	0.44	5.37	0.1074
120	Gasoline - PTE RVP schedule	0.189	0.209	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.357	0.236	0.44	2.2	0.044
114	Blendstock RVP 15	0.181	0.201	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.342	0.226	0.46	5.16	0.1032
115	Blendstock RVP 15	0.181	0.201	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.342	0.226	0.46	8.07	0.1614
117	Component RVP 14.33	0.181	0.201	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.342	0.226	0.44	4.16	0.0832
118	Component RVP 14.33	0.181	0.201	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.342	0.226	0.44	3.44	0.0688
119	Component RVP 14.33	0.181	0.201	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.342	0.226	0.44	2.2	0.044
121	Blendstock RVP 15	0.181	0.201	0.284	0.451	0.646	0.884	1.000	0.963	0.742	0.489	0.342	0.226	0.46	8.07	0.1614

Notes

1. The ratio was calculated and used as follows:
    - Landing or cleaning total VOC emissions were calculated for each month.
    - The xylene emissions for each month were calculated based on the speciation for that month for the given product.
    - The ratio used for variable emission rate factors in AERMOD was calculated by dividing the xylene emission rate for a given month by the July xylene emission rate.
    - The July xylene emission rate was then entered as the emission rate for the source in the Source inputs screen in AERMOD View.
2. Emission rates represent the total xylene emissions for the tank. For landings, 80% of that value was at a release height at the top of the tank. The remaining 20% was at half of the tank height.

For vapor space purge, all of the emissions were placed at the height of the manway.

Global Albany Annual Toluene Model Assumptions - TANKS

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.61E-03
Emission Rate (lb/yr)	From PTE Calculations	66.64
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.61E-03
Emission Rate (lb/yr)	From PTE Calculations	66.64
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.61E-03
Emission Rate (lb/yr)	From PTE Calculations	66.64
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.58E-03
Emission Rate (lb/yr)	From PTE Calculations	66.37
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.16E-03
Emission Rate (lb/yr)	From PTE Calculations	53.99
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

Global Albany Annual Toluene Model Assumptions - TANKS

Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.90E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	166.14
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	7.15E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	62.66
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.74E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	41.54
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.79E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	15.66
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.90E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	166.18
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	7.16E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	62.69
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.74E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	41.54
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.79E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	15.67
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

Global Albany Annual Toluene Model Assumptions - TANKS

Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.74E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	152.66
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	5.61E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	49.18
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.36E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	38.17
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.40E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	12.29
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.58E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	138.35
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	3.98E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	34.86
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	3.95E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	34.59
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	9.95E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	8.72
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Toluene Model Assumptions - TANKS

Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.89E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	165.81
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.68E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	234.80
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.73E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	41.45
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.70E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	58.70
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.09E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	183.47
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.88E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	252.46
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.24E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	45.87
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.21E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	63.12
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Toluene Model Assumptions - TANKS

Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.64E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	143.88
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.43E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	212.87
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.11E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	35.97
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.08E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	53.22
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.85E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	162.09
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.64E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	231.08
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.63E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	40.52
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.59E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	57.77
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Toluene Model Assumptions - TANKS

Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.88E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	165.02
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.67E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	234.02
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.71E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	41.26
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.68E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	58.50
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.47E-02
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	216.75
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.26E-02
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	285.74
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.19E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	54.19
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.15E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	71.44
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

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Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	3.39E-03
Emission Rate (lb/yr)	From PTE Calculations	29.68
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	8.47E-04
Emission Rate (lb/yr)	From PTE Calculations	7.42
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Toluene Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

General Parameters	
Parameter	**Value**
Projection	**UTM**
Datum	NAD83
UTM Zone	18
Hemisphere	Northern
AERMET	2016-2020 MET Data
AERMAP	1-deg DEM Data from webgis.com

Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.61E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.61E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.61E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.58E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.16E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.90E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93

Global Albany Hourly Toluene Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.74E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.90E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.74E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.74E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.36E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

Global Albany Hourly Toluene Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.58E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	3.95E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.89E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.73E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.09E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

Global Albany Hourly Toluene Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	5.24E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.64E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.11E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.85E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.63E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Toluene Model Assumptions - TANKS

See Separate Table for Vapor Space Purge During Cleanings

Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.88E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	4.71E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	2.47E-02
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.19E-03
Emission Rate (lb/hr) During Refill After Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for Toluene	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	3.39E-03
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	8.47E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Toluene Model Assumptions - Vapor Space Purge During Tank Cleaning

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 29 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 30 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 33 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 64 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 31 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16
Tank 31 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 32 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.75
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.30
Tank 32 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400

Global Albany Hourly Toluene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 39 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.54
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.18
Tank 39 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 120 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.58
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.20
Tank 120 (Gasoline) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 114 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.71
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.26
Tank 114 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400

Global Albany Hourly Toluene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 115 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.33
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.10
Tank 115 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 117 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.20
Tank 117 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 118 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.42
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.12
Tank 118 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400

Global Albany Hourly Toluene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 119 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.38
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.10
Tank 119 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 121 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for Toluene Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16
Tank 121 (Blendstock) (During Controlled Cleaning - Horizontal Point Source)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for toluene Table	
Release Height (ft)	Stack Height above ground	13
Diameter (ft)	Inside diameter of stack	2.5
Exit Velocity (ft/s)	Calculated from contractor data	5.1
Gas Exit Temperature (degrees F)	From cleaning contractor	1400
Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
See Hourly Assumptions Table		
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
See Hourly Assumptions Table		

Variable Emission Rate Calculations for Toluene Modeling

		Ratios Used for Variable Emission Rates[1]												July Toluene Emission Rates[2]		
Tank	**Product Assumed**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Refill after landing (lb/hr)**	**Uncontrolled Vapor Space Purge (lb/hr)**	**Controlled Vapor Space Purge (lb/hr)**
31	Gasoline - PTE RVP schedule	0.234	0.256	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.408	0.284	1.54	18.8	0.376
32	Gasoline - PTE RVP schedule	0.234	0.256	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.408	0.284	1.54	18.8	0.376
39	Gasoline - PTE RVP schedule	0.234	0.256	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.408	0.284	1.54	18.8	0.376
120	Gasoline - PTE RVP schedule	0.234	0.256	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.408	0.284	1.54	7.69	0.1538
114	Blendstock RVP 15	0.224	0.245	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.391	0.272	1.74	19.35	0.387
115	Blendstock RVP 15	0.224	0.245	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.391	0.272	1.72	30.2	0.604
117	Component RVP 14.33	0.224	0.245	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.391	0.272	1.65	15.58	0.3116
118	Component RVP 14.33	0.224	0.245	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.391	0.272	1.65	12.9	0.258
119	Component RVP 14.33	0.224	0.245	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.391	0.272	1.65	8.24	0.1648
121	Blendstock RVP 15	0.224	0.245	0.332	0.498	0.682	0.897	1.000	0.967	0.770	0.534	0.391	0.272	1.72	30.2	0.604

Notes

1. The ratio was calculated and used as follows:

   Landing or cleaning total VOC emissions were calculated for each month.

   The toluene emissions for each month were calculated based on the speciation for that month for the given product.

   The ratio used for variable emission rate factors in AERMOD was calculated by dividing the toluene emission rate for a given month by the July toluene emission rate.

   The July toluene emission rate was then entered as the emission rate for the source in the Source inputs screen in AERMOD View.

2. Emission rates represent the total toluene emissions for the tank. For landings, 80% of that value was at a release height at the top of the tank. The remaining 20% was at half of the tank height.
For vapor space purge, all of the emissions were placed at the height of the manway.

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.95E-04
Emission Rate (lb/yr)	From PTE Calculations	8.72
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 29 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.95E-04
Emission Rate (lb/yr)	From PTE Calculations	8.72
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 30 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.95E-04
Emission Rate (lb/yr)	From PTE Calculations	8.72
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 33 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.91E-04
Emission Rate (lb/yr)	From PTE Calculations	8.68
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient
Tank 64 (Distillate) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	7.95E-04
Emission Rate (lb/yr)	From PTE Calculations	6.96
Release Height (ft)	Tank height. Approx. height of roof vents	45
Stack Inside Diameter (ft)	Assumed	0.00328
Gas Exit Velocity (ft/s)	Assumed	0.00328
Gas Exit Temperature	Assumed	Ambient

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

Tank 31 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.15E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	18.83
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	9.12E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	7.99
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.37E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.71
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	2.28E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	2.00
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.15E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	18.84
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	9.13E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	8.00
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.38E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.71
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	2.28E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	2.00
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

Tank 39 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.94E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	16.98
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	7.00E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	6.14
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.85E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.24
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.75E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	1.53
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Gasoline) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	1.74E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	15.23
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	5.00E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	4.38
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Gasoline) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.35E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	3.81
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, no landings at this tank	1.25E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, no landings at this tank	1.10
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

Tank 114 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.41E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	21.15
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.24E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	28.37
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.03E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.29
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.10E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.09
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.62E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	22.97
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.45E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	30.20
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.56E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.74
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.62E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.55
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

Tank 117 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.02E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	17.71
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	2.85E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	24.94
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.06E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.43
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.12E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.24
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.17E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	19.03
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.00E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	26.25
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.43E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.76
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.49E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.56
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

Tank 119 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	2.17E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	19.03
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.00E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	26.25
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	5.43E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	4.76
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	7.49E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	6.56
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Blendstock) (UPPER Volume Source, 80% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	3.04E-03
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	26.63
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	3.87E-03
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	33.86
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (LOWER Volume Source, 20% of emissions)		
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	7.60E-04
Emission Rate for Annual Runs 1 through 7 and 9 (lb/hr)	From PTE Calculations, with landings at 2.2 TPY per tank	6.66
Emission Rate for Annual Run 8 (lb/hr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	9.66E-04
Emission Rate for Annual Run 8 (lb/yr)	From PTE Calculations, 3.7 TPY landings per blendstock tank	8.47
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Annual Ethylbenzene Model Assumptions - TANKS

Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	2.18E-04
Emission Rate (lb/yr)	From PTE Calculations	1.91
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	From PTE Calculations	5.46E-05
Emission Rate (lb/yr)	From PTE Calculations	0.48
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Attachment 2

Modeling Parameters for Loading

Global Albany Loading Model Parameters

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Truck Rack VRU (VRUTK) (Point Source)		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Stack Height (ft)	Actual Stack Height	22.4
Stack Temperature	Release Temperature	Ambient
Stack Velocity (m/s)	Calculated	3.46
Stack Diameter (ft)	Actual Stack Diameter	1
Emissions Limit (mg/L)		2
Rail VCU (VCURR) (Point Source)		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1350
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	8
Emissions Limit (mg/L)		2
Marine VCU (VCUM1) (Point Source) Refined or Blendstock OS#3		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	6
Emissions Limit (mg/L)		10
Marine VCU (VCUM1) (Point Source) Crude OS#3		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	6
Emissions Limit (mg/L)		10

Marine VCU (VCUM2) (Point Source), Refined or Blendstock OS#1 or OS#2		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Marine VCU (VCUM2) (Point Source), Crude OS#1 or Crude OS#2		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Truck Fugitives (Volume Source) OS#4 Only		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Release Height (ft)	Center of Plume	10
Initial Horizontal Dimension (ft)	Length of Side divided by 4.3	31.4
Initial Vertical Dimension (ft)	Center of Plume height divided by 2.15	4.65
Barge Fugitives (Area Source) OS#2 Only		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft2)	Barge Area	9178.8
Barge Fugitives (Area Source) Crude OS#2 Only		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft2)	Barge Area	9178.8
Rail Fugitives (Volume Source) OS#5 Only		
Emission Rate (lb/hr)	See Loading Assumptions Spreadsheet for Each Pollutant	
Release Height (ft)	Release Height	17
Initial Horizontal Dimension (ft)	Length of Side divided by 4.3	54.88
Initial Vertical Dimension (ft)	Center of Plume height divided by 2.15	7.91

MODEL RUN ASSUMPTION DETAILS - Benzene

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments *(see separate tables for emission rates)*
			Description	**VCUM1**	**VCUM2**	**Barge Fugitives**	**Description**	**VRUTK**	**Fugitives**	**Description**	**VCURR**	**Fugitives**	
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	OS#1 369 MM gallons refined as gas at 2 mg/l with vac assist, 380 MM blendstock at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.0088 lb/hr 77 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.0077 lb/hr 67.5 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.0026 lb/hr 23 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.00969 lb/hr 84.9 lb/yr	3.69E-8 lb/hr/ft2 17.9 lb/yr	No loading	0	0	OS#5 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0014 lb/hr 12.5 lb/yr	0.0057 lb/hr 50.2 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.00969 lb/hr 84.9 lb/yr	3.69E-8 lb/hr/ft2 17.9 lb/yr	OS#4 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0014 lb/hr 12.5 lb/yr	0.0057 lb/hr 50.2 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail under OS#1, remaining loading at truck under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.01 lb/hr 88.6 lb/yr	0	OS#1 728.3 MM as gas at 2 mg/l with vac assist	0.0064 lb/hr 55.9 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.0026 lb/hr 23 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.01 lb/hr 88.6 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.0077 lb/hr 67.5 lb/yr	0	OS#1 149 MM gallons gas at 2 mg/l with vac assist	0.0013 lb/hr 11.4 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0018 lb/hr 15.8 lb/yr	3.52E-9 lb/hr/ft2 1.7 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0034 lb/hr 29.6 lb/yr	0.014 lb/hr 118.4 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0018 lb/hr 15.8 lb/yr	3.52E-9 lb/hr/ft2 1.7 lb/yr	OS#4 85.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	7.5E-4 lb/hr 6.6 lb/yr	0.003 lb/hr 26.3 lb/yr	OS#5 300 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0026 lb/hr 23 lb/yr	0.01 lb/hr 92.1 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0018 lb/hr 15.8 lb/yr	3.52E-9 lb/hr/ft2 1.7 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0034 lb/hr 29.6 lb/yr	0.014 lb/hr 118.4 lb/yr	No loading	0	0	landings evenly distributed between blendstock tanks
Global Alb Annual All Run 9	Annual	emissions at VCUM1 instead of VCUM2	380 MM gallons blendstock and 5.66 MM gallons refined under OS#3, 90 MM gallons crude under OS#CRD3	0.019 lb/hr 167.6 lb/yr	0	0	No loading	0	0	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Hourly All Run 0	Hourly	hourly loading with fugitives, no cleanings or landings	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	No cleanings or landings, annual emissions at all tanks
Global Alb Hourly All Run 1	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 31 landing, annual emissions at other tanks
Global Alb Hourly All Run 2	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 32 landing, annual emissions at other tanks
Global Alb Hourly All Run 3	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 39 landing, annual emissions at other tanks
Global Alb Hourly All Run 4	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 114 landing, annual emissions at other tanks
Global Alb Hourly All Run 5	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 115 landing, annual emissions at other tanks
Global Alb Hourly All Run 6	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 117 landing, annual emissions at other tanks
Global Alb Hourly All Run 7	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 118 landing, annual emissions at other tanks
Global Alb Hourly All Run 8	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 119 landing, annual emissions at other tanks
Global Alb Hourly All Run 9	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 121 landing, annual emissions at other tanks
Global Alb Hourly All Run 10	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 120 landing, annual emissions at other tanks

MODEL RUN ASSUMPTION DETAILS - Benzene

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments *(see separate tables for emission rates)*
			Description	VCUM1	VCUM2	Barge Fugitives	Description	VRUTK	Fugitives	Description	VCURR	Fugitives	
Global Alb Hourly All Run 11	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 31 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 12	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 32 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 13	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 39 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 14	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 114 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 15	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 115 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 16	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 117 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 17	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 118 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 18	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 119 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 19	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 121 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 20	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	Tank 120 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Controlled Cleaning Runs	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.081 lb/hr	3.41E-7 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.018 lb/hr	0.074 lb/hr	4500 gpm loading rate as gas with fugitives	0.021 lb/hr	0.083 lb/hr	

MODEL RUN ASSUMPTION DETAILS - HEXANE

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments
			Description	**VCUM1**	**VCUM2**	**Barge Fugitives**	**Description**	**VRUTK**	**Fugitives**	**Description**	**VCURR**	**Fugitives**	*(see separate tables for*
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	OS#1 369 MM gallons refined as gas at 2 mg/l with vac assist, 380 MM blendstock at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.038 lb/hr 328.5 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.007 lb/hr 61.6 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.0024 lb/hr 21 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.039 lb/hr 338.6 lb/yr	1.66E-7 lb/hr/ft2 10.4 lb/yr	No loading	0	0	OS#5 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0013 lb/hr 11.46 lb/yr	0.0052 lb/hr 45.8 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.039 lb/hr 338.6 lb/yr	1.66E-7 lb/hr/ft2 10.4 lb/yr	OS#4 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0013 lb/hr 11.46 lb/yr	0.0052 lb/hr 45.8 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail under OS#1, remaining loading at truck under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.039 lb/hr 338.6 lb/yr	0	OS#1 728.3 MM as gas at 2 mg/l with vac assist	0.0058 lb/hr 51.1 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.0024 lb/hr 21 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.039 lb/hr 338.6 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.007 lb/hr 61.6 lb/yr	0	OS#1 149 MM gallons gas at 2 mg/l with vac assist	0.0012 lb/hr 10.4 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0019 lb/hr 17 lb/yr	3.79E-9 lb/hr/ft2 1.8 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0031 lb/hr 27 lb/yr	0.012 lb/hr 108.1 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0019 lb/hr 17 lb/yr	3.79E-9 lb/hr/ft2 1.8 lb/yr	OS#4 85.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	6.9E-4 lb/hr 6 lb/yr	0.0027 lb/hr 24 lb/yr	OS#5 300 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0024 lb/hr 21 lb/yr	0.0096 lb/hr 84.1 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0019 lb/hr 17 lb/yr	3.79E-9 lb/hr/ft2 1.8 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0031 lb/hr 27 lb/yr	0.012 lb/hr 108.1 lb/yr	No loading	0	0	landings evenly distributed between blendstock tanks
Global Alb Annual All Run 9	Annual	emissions at VCUM1 instead of VCUM2	380 MM gallons blendstock and 5.66 MM gallons refined under OS#3, 90 MM gallons crude under OS#CRD3	0.17 lb/hr 1523 lb/yr	0	0	No loading	0	0	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank

MODEL RUN ASSUMPTION DETAILS - 2,2,4-TMP

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments
			Description	**VCUM1**	**VCUM2**	**Barge Fugitives**	**Description**	**VRUTK**	**Fugitives**	**Description**	**VCURR**	**Fugitives**	*(see separate tables for*
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	OS#1 369 MM gallons refined as gas at 2 mg/l with vac assist, 380 MM blendstock at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.0076 lb/hr 66.5 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.0087 lb/hr 76.3 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.003 lb/hr 26 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0091 lb/hr 79.3 lb/yr	3.79E-8 lb/hr/ft2 18.4 lb/yr	No loading	0	0	OS#5 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0016 lb/hr 14.2 lb/yr	0.0065 lb/hr 56.7 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.0091 lb/hr 79.3 lb/yr	3.79E-8 lb/hr/ft2 18.4 lb/yr	OS#4 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0016 lb/hr 14.2 lb/yr	0.0065 lb/hr 56.7 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail under OS#1, remaining loading at truck under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.0091 lb/hr 79.6 lb/yr	0	OS#1 728.3 MM as gas at 2 mg/l with vac assist	0.0072 lb/hr 63.2 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.003 lb/hr 26 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.0091 lb/hr 79.6 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.0087 lb/hr 76.3 lb/yr	0	OS#1 149 MM gallons gas at 2 mg/l with vac assist	0.0015 lb/hr 12.9 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	1.4E-4 lb/hr 1.2 lb/yr	2.71E-10 lb/hr/ft2 0.13 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0038 lb/hr 33.5 lb/yr	0.015 lb/hr 133.9 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	1.4E-4 lb/hr 1.2 lb/yr	2.71E-10 lb/hr/ft2 0.13 lb/yr	OS#4 85.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	8.5E-4 lb/hr 7.4 lb/yr	0.0034 lb/hr 29.7 lb/yr	OS#5 300 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.003 lb/hr 26 lb/yr	0.012 lb/hr 104.2 lb/hr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	1.4E-4 lb/hr 1.2 lb/yr	2.71E-10 lb/hr/ft2 0.13 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0038 lb/hr 33.5 lb/yr	0.015 lb/hr 133.9 lb/yr	No loading	0	0	landings evenly distributed between blendstock tanks
Global Alb Annual All Run 9	Annual	emissions at VCUM1 instead of VCUM2	380 MM gallons blendstock and 5.66 MM gallons refined under OS#3, 90 MM gallons crude under OS#CRD3	0.0024 lb/hr 168.9 lb/yr	0	0	No loading	0	0	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank

MODEL RUN ASSUMPTION DETAILS - Xylenes

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments *(see separate tables for emission rates)*
			Description	VCUM1	VCUM2	Barge Fugitives	Description	VRUTK	Fugitives	Description	VCURR	Fugitives	
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	OS#1 369 MM gallons refined as gas at 2 mg/l with vac assist, 380 MM blendstock at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.081 lb/hr 713 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.095 lb/hr 833.6 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.032 lb/hr 284.4 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.098 lb/hr 855.7 lb/yr	4.12E-7 lb/hr/ft2 199.6 lb/yr	No loading	0	0	OS#5 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.018 lb/hr 154.9 lb/yr	0.071 lb/hr 619.8 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.098 lb/hr 855.7 lb/yr	4.12E-7 lb/hr/ft2 199.6 lb/yr	OS#4 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.018 lb/hr 154.9 lb/yr	0.071 lb/hr 619.8 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail under OS#1, remaining loading at truck under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.098 lb/hr 856 lb/yr	0	OS#1 728.3 MM as gas at 2 mg/l with vac assist	0.079 lb/hr 690.5 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.032 lb/hr 284.4 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.098 lb/hr 856 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.095 lb/hr 833.6 lb/yr	0	OS#1 149 MM gallons gas at 2 mg/l with vac assist	0.016 lb/hr 141.3 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	2.78E-4 lb/hr 2.4 lb/yr	5.4E-10 lb/hr/ft2 0.26 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.042 lb/hr 365.6 lb/yr	0.17 lb/hr 1462.5 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	2.78E-4 lb/hr 2.4 lb/yr	5.4E-10 lb/hr/ft2 0.26 lb/yr	OS#4 85.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0093 lb/hr 81.2 lb/yr	0.037 lb/hr 324.8 lb/yr	OS#5 300 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.032 lb/hr 284.4 lb/yr	0.13 lb/hr 1137.6 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	2.78E-4 lb/hr 2.4 lb/yr	5.4E-10 lb/hr/ft2 0.26 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.042 lb/hr 365.6 lb/yr	0.17 lb/hr 1462.5 lb/yr	No loading	0	0	landings evenly distributed between blendstock tanks
Global Alb Annual All Run 9	Annual	emissions at VCUM1 instead of VCUM2	380 MM gallons blendstock and 5.66 MM gallons refined under OS#3, 90 MM gallons crude under OS#CRD3	0.21 lb/hr 1831 lb/yr	0	0	No loading	0	0	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Hourly All Run 10X	Hourly	hourly loading with fugitives, no cleanings or landings	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	No cleanings or landings, annual emissions at all tanks
Global Alb Hourly All Run 1 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 31 landing, annual emissions at other tanks
Global Alb Hourly All Run 2 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 32 landing, annual emissions at other tanks
Global Alb Hourly All Run 3 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 39 landing, annual emissions at other tanks
Global Alb Hourly All Run 4 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 114 landing, annual emissions at other tanks
Global Alb Hourly All Run 5 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 115 landing, annual emissions at other tanks
Global Alb Hourly All Run 6 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 117 landing, annual emissions at other tanks
Global Alb Hourly All Run 7 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 118 landing, annual emissions at other tanks

MODEL RUN ASSUMPTION DETAILS - Xylenes

File Name	**Annual or Hourly**	**Overall Comments**	**Marine Loading**				**Truck loading**			**Rail Loading**			**Tank Comments** *(see separate tables for emission rates)*
			Description	**VCUM1**	**VCUM2**	**Barge Fugitives**	**Description**	**VRUTK**	**Fugitives**	**Description**	**VCURR**	**Fugitives**	
Global Alb Hourly All Run 8 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 119 landing, annual emissions at other tanks
Global Alb Hourly All Run 9 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 121 landing, annual emissions at other tanks
Global Alb Hourly All Run 10 X	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 120 landing, annual emissions at other tanks
Global Alb Hourly All Run 11 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 31 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 12 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 32 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 13 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 39 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 14 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 114 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 15 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 115 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 16 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 117 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 17 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 118 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 18 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 119 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 19 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 121 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 20 X	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	Tank 120 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Controlled Cleaning Runs	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.995 lb/hr	4.21E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.23 lb/hr	0.91 lb/hr	4500 gpm loading rate as gas with fugitives	0.26 lb/hr	1.02 lb/hr	

MODEL RUN ASSUMPTION DETAILS - Toluene

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments
			Description	VCUM1	VCUM2	Barge Fugitives	Description	VRUTK	Fugitives	Description	VCURR	Fugitives	*(see separate tables for*
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	OS#1 369 MM gallons refined as gas at 2 mg/l with vac assist, 380 MM blendstock at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.035 lb/hr 309 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.04 lb/hr 352.2 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.014 lb/hr 120.2 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.042 lb/hr 367.8 lb/yr	1.76 lb/hr/ft2 85 lb/yr	No loading	0	0	OS#5 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0075 lb/hr 65.5 lb/yr	0.03 lb/hr 261.9 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.042 lb/hr 367.8 lb/yr	1.76 lb/hr/ft2 85 lb/yr	OS#4 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	0.0075 lb/hr 65.5 lb/yr	0.03 lb/hr 261.9 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail under OS#1, remaining loading at truck under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.042 lb/hr 369.5 lb/yr	0	OS#1 728.3 MM as gas at 2 mg/l with vac assist	0.033 lb/hr 291.7 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.014 lb/hr 120.2 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.042 lb/hr 369.5 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.04 lb/hr 352.2 lb/yr	0	OS#1 149 MM gallons gas at 2 mg/l with vac assist	0.0068 lb/hr 59.7 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	8.3E-4 lb/hr 7.3 lb/yr	1.63E-9 lb/hr/ft2 0.79 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.018 lb/hr 154.5 lb/yr	0.071 lb/hr 617.9 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	8.3E-4 lb/hr 7.3 lb/yr	1.63E-9 lb/hr/ft2 0.79 lb/yr	OS#4 85.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0039 lb/hr 34.3 lb/yr	0.016 lb/hr 137.3 lb/yr	OS#5 300 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.014 lb/hr 120.2 lb/yr	0.055 lb/hr 480.7 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	8.3E-4 lb/hr 7.3 lb/yr	1.63E-9 lb/hr/ft2 0.79 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.018 lb/hr 154.5 lb/yr	0.071 lb/hr 617.9 lb/yr	No loading	0	0	landings evenly distributed between blendstock tanks
Global Alb Annual All Run 9	Annual	emissions at VCUM1 instead of VCUM2	380 MM gallons blendstock and 5.66 MM gallons refined under OS#3, 90 MM gallons crude under OS#CRD3	0.089 lb/hr 781.5 lb/yr	0	0	No loading	0	0	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Hourly All Run 0 T	Hourly	hourly loading with fugitives, no cleanings or landings	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	No cleanings or landings, annual emissions at all tanks
Global Alb Hourly All Run 1 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 31 landing, annual emissions at other tanks
Global Alb Hourly All Run 2 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 32 landing, annual emissions at other tanks
Global Alb Hourly All Run 3 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 39 landing, annual emissions at other tanks
Global Alb Hourly All Run 4 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 114 landing, annual emissions at other tanks
Global Alb Hourly All Run 5 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 115 landing, annual emissions at other tanks
Global Alb Hourly All Run 6 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 117 landing, annual emissions at other tanks
Global Alb Hourly All Run 7 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 118 landing, annual emissions at other tanks
Global Alb Hourly All Run 8 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 119 landing, annual emissions at other tanks

MODEL RUN ASSUMPTION DETAILS - Toluene

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments
			Description	**VCUM1**	**VCUM2**	**Barge Fugitives**	**Description**	**VRUTK**	**Fugitives**	**Description**	**VCURR**	**Fugitives**	*(see separate tables for*
Global Alb Hourly All Run 9 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 121 landing, annual emissions at other tanks
Global Alb Hourly All Run 10 T	Hourly	hourly loading with fugitives and tank landing	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 120 landing, annual emissions at other tanks
Global Alb Hourly All Run 11 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 31 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 12 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 32 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 13 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 39 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 14 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 114 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 15 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 115 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 16 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 117 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 17 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 118 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 18 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 119 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 19 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 121 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Global Alb Hourly All Run 20 T	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	Tank 120 cleaning, annual emissions at other tanks, uncontrolled vapor space purge
Controlled Cleaning Runs	Hourly	hourly loading with fugitives and tank cleaning	25000 bph loading rate at VCUM2 as gas with fugitives	0	0.42 lb/hr	1.78E-6 lb/hr/ft2	4000 gpm loading rate as gas with fugitives	0.096 lb/hr	0.38 lb/hr	4500 gpm loading rate as gas with fugitives	0.11 lb/hr	0.43 lb/hr	

MODEL RUN ASSUMPTION DETAILS - Ethylbenzene

File Name	Annual or Hourly	Overall Comments	Marine Loading				Truck loading			Rail Loading			Tank Comments
			Description	**VCUM1**	**VCUM2**	**Barge Fugitives**	**Description**	**VRUTK**	**Fugitives**	**Description**	**VCURR**	**Fugitives**	*(see separate tables for*
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	OS#1 369 MM gallons refined as gas at 2 mg/l with vac assist, 380 MM blendstock at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.0042 lb/hr 37 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.0049 lb/hr 42.6 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.0017 lb/hr 14.5 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.005 lb/hr 44.2 lb/yr	2.11E-8 lb/hr/ft2 10.2 lb/yr	No loading	0	0	OS#5 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	9E-4 lb/hr 7.9 lb/yr	0.0036 lb/hr 31.6 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	OS#2 900 MM gallons refined loading of inerted vessels at 2 mg/l (99.9%), OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	0.005 lb/hr 44.2 lb/yr	2.11E-8 lb/hr/ft2 10.2 lb/yr	OS#4 163.437 MM as gas at 2 mg/l and 8 mg/l fugitives	9E-4 lb/hr 7.9 lb/yr	0.0036 lb/hr 31.6 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail under OS#1, remaining loading at truck under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.005 lb/hr 44.3 lb/yr	0	OS#1 728.3 MM as gas at 2 mg/l with vac assist	0.004 lb/hr 32.3 lb/yr	0	OS#1 300 MM gallons gas at 2 mg/l with vac assist	0.0017 lb/hr 14.5 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail under OS#1	OS#1 900 MM gallons refined as gas at 2 mg/l with vac assist, OS#CRD1 450 MM gallons crude at 2 mg/l with vac assist	0	0.005 lb/hr 44.3 lb/yr	0	OS#1 879.3 MM gallons refined as gas at 2 mg/l with vac assist	0.0049 lb/hr 42.6 lb/yr	0	OS#1 149 MM gallons gas at 2 mg/l with vac assist	8.2E-4 lb/hr 7.2 lb/yr	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	6.94E-5 lb/hr 0.6 lb/yr	1.35E-10 lb/hr/ft2 0.066 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0021 lb/hr 18.7 lb/yr	0.0085 74.7 lb/yr	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	6.94E-5 lb/hr 0.6 lb/yr	1.35E-10 lb/hr/ft2 0.066 lb/yr	OS#4 85.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	4.7E-4 lb/hr 4.1 lb/yr	0.0019 lb/hr 16.6 lb/yr	OS#5 300 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0017 lb/hr 14.5 lb/yr	0.0066 lb/hr 58.1 lb/yr	Landings evenly distributed at 2.2 tpy per tank
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	OS#CRD2 364.5 MM gallons crude loading of inerted vessels at 2 mg/l (99.9%)	0	6.94E-5 lb/hr 0.6 lb/yr	1.35E-10 lb/hr/ft2 0.066 lb/yr	OS#4 385.66 MM gallons as gas at 2 mg/l with 8 mg/l fugitives	0.0021 lb/hr 18.7 lb/yr	0.0085 74.7 lb/yr	No loading	0	0	landings evenly distributed between blendstock tanks
Global Alb Annual All Run 9	Annual	emissions at VCUM1 instead of VCUM2	380 MM gallons blendstock and 5.66 MM gallons refined under OS#3, 90 MM gallons crude under OS#CRD3	0.011 lb/hr 94.1 lb/yr	0	0	No loading	0	0	No loading	0	0	Landings evenly distributed at 2.2 tpy per tank

Attachment 3

H_2S Model Parameters

Global Albany Annual H_2S Model Assumptions

General Parameters	
Parameter	**Value**
Projection	**UTM**
Datum	NAD83
UTM Zone	18
Hemisphere	Northern
AERMET	2016-2020 MET Data
AERMAP	1-deg DEM Data from webgis.com

Sources	**Assumptions/ Notes**	**Value**
Marine VCU (VCUM2) (Point Source) - With Vac Assist		
Emission Rate (lb/hr)	See Calculations Attachment	9.13E-04
Emission Rate (lb/yr)	See Calculations Attachment	8
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Marine VCU (VCUM2) (Point Source) - Crude OS#2		
Emission Rate (lb/hr)	See Calculations Attachment	8.20E-04
Emission Rate (lb/yr)	See Calculations Attachment	7.18
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Barge Fugitives (Area Source) Crude OS#2 Only		
Emission Rate (lb/hr/ft2)	See Calculations Attachment	1.60E-09
Emission Rate (lb/yr)	See Calculations Attachment	0.773
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft2)	Barge Area	55294.2
Tank 31 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.20E-03
Emission Rate (lb/yr)	See Calculations Attachment	10.58
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	3.00E-04
Emission Rate (lb/yr)	See Calculations Attachment	2.64
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.20E-03
Emission Rate (lb/yr)	See Calculations Attachment	10.58
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	3.00E-04
Emission Rate (lb/yr)	See Calculations Attachment	2.65
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47

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Tank 39 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.10E-03
Emission Rate (lb/yr)	See Calculations Attachment	9.30
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.70E-04
Emission Rate (lb/yr)	See Calculations Attachment	2.33
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	6.10E-04
Emission Rate (lb/yr)	See Calculations Attachment	5.33
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.50E-04
Emission Rate (lb/yr)	See Calculations Attachment	1.33
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 114 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	8.83E-04
Emission Rate (lb/yr)	See Calculations Attachment	7.74
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.20E-04
Emission Rate (lb/yr)	See Calculations Attachment	1.93
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.30E-03
Emission Rate (lb/yr)	See Calculations Attachment	11.70
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	3.30E-04
Emission Rate (lb/yr)	See Calculations Attachment	2.93
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 117 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	6.65E-04
Emission Rate (lb/yr)	See Calculations Attachment	5.82
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

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Tank 117 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.70E-04
Emission Rate (lb/yr)	See Calculations Attachment	1.46
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	8.85E-04
Emission Rate (lb/yr)	See Calculations Attachment	7.75
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.20E-04
Emission Rate (lb/yr)	See Calculations Attachment	1.94
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 119 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	8.40E-04
Emission Rate (lb/yr)	See Calculations Attachment	7.36
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.10E-04
Emission Rate (lb/yr)	See Calculations Attachment	1.84
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 121 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.70E-03
Emission Rate (lb/yr)	See Calculations Attachment	15.23
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	4.30E-04
Emission Rate (lb/yr)	See Calculations Attachment	3.81
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly H_2S Model Assumptions

See Separate Table for Vapor Space Purge During Cleanings

General Parameters	
Parameter	**Value**
Projection	**UTM**
Datum	NAD83
UTM Zone	18
Hemisphere	Northern
AERMET	2016-2020 MET Data
AERMAP	1-deg DEM Data from webgis.com

Sources	**Assumptions/ Notes**	**Value**
Marine VCU (VCUM2) (Point Source)		
Emission Rate (lb/hr)	See Calculations Attachment	2.10E-02
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Barge Fugitives (Area Source) Crude OS#2 Only		
Emission Rate (lb/hr/ft2)	See Calculations Attachment	4.03E-08
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft2)	Barge Area	55294.2
Tank 31 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate Not During Landing (lb/hr)	See Calculations Attachment	1.20E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate Not During Landing (lb/hr)	See Calculations Attachment	3.00E-04
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 32 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.20E-03
Emission Rate (lb/hr) During Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for H2S	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93

Global Albany Hourly H_2S Model Assumptions

Tank 32 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	3.00E-04
Emission Rate (lb/hr) During Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for H2S	
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 39 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.10E-03
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.70E-04
Release Height (ft)	Tank height. Approx. height of roof vents	22.5
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	10.47
Tank 120 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	6.10E-04
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 120 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.50E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly H_2S Model Assumptions

Tank 114 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	8.83E-04
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.20E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 115 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.30E-03
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	3.30E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 117 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate Not During Landing (lb/hr)	See Calculations Attachment	6.65E-04
Emission Rate (lb/hr) During Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for H2S	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

Global Albany Hourly H_2S Model Assumptions

Tank 117 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate Not During Landing (lb/hr)	See Calculations Attachment	1.70E-04
Emission Rate (lb/hr) During Landing	Calculated based on 1500 bph refill rate and calculations in Variable Emissions Rate Spreadsheet for H2S	
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 118 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	8.85E-04
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.20E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16
Tank 119 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	8.40E-04
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	2.10E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly H_2S Model Assumptions

Tank 121 (Crude) (UPPER Volume Source, 80% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	1.70E-03
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Crude) (LOWER Volume Source, 20% of emissions)		
Emission Rate (lb/hr)	See Calculations Attachment	4.30E-04
Release Height (ft)	Tank height. Approx. height of roof vents	24
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	11.16

Global Albany Hourly Toluene Model Assumptions - Vapor Space Purge During Tank Cleaning

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		NAD83
UTM Zone		18
Hemisphere		Northern
AERMET		2016-2020 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Tank 28 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 29 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 30 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 33 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 64 (Distillate) (Point Source)		
See Hourly Assumptions Table		
Tank 31 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 32 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for H2S Table	
Release Height (ft)	Actual Height of Manway above ground	2.75
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.30
Tank 39 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 120 (Gasoline) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 114 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 115 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 117 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		

Global Albany Hourly Toluene Model Assumptions - Vapor Space Purge During Tank Cleaning

Tank 118 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 119 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
See Hourly Assumptions Table		
Tank 121 (Blendstock) (During Cleaning - Volume Source at Manway Height)		
Model Assumptions Not During Cleaning	See Hourly Model Assumptions Table	
Emission Rate (lb/hr) During Cleaning	See Variable Emission Rate for H2S Table	
Release Height (ft)	Actual Height of Manway above ground	2.5
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Release height divided by 2.15	1.16
Tank 130 (Product/ Water Mixture) (UPPER Volume Source, 80% of emissions)		
See Hourly Assumptions Table		
Tank 130 (Product/ Water Mixture) (LOWER Volume Source, 20% of emissions)		
See Hourly Assumptions Table		

Variable Emission Rate Calculations for H2S Modeling

		Ratios Used for Variable Emission Rates[1]												July H2S Emission Rates[2]	
Tank	**Product Assumed**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Refill after landing (lb/hr)**	**Uncontrolled Vapor Space Purge (lb/hr)**
32	Crude RVP 12.5	0.502	0.522	0.600	0.722	0.836	0.950	1.000	0.985	0.884	0.746	0.646	0.548	0.36	4.4
117	Crude RVP 12.5	0.502	0.522	0.600	0.722	0.836	0.950	1.000	0.985	0.884	0.746	0.646	0.548	0.36	N/A
121	Crude RVP 12.5	0.502	0.522	0.600	0.722	0.836	0.950	1.000	0.985	0.884	0.746	0.646	0.548	N/A	6.35

Notes

1. The ratio was calculated and used as follows:

Landing or cleaning total VOC emissions were calculated for each month.

The H2S emissions for each month were calculated based on the speciation for that month for crude oil.

The ratio used for variable emission rate factors in AERMOD was calculated by dividing the H2S emission rate for a given month by the July H2S emission rate.

The July H2S emission rate was then entered as the emission rate for the source in the Source inputs screen in AERMOD View.

2. Emission rates represent the total H2S emissions for the tank. For landings, 80% of that value was at a release height at the top of the tank. The remaining 20% was at half of the tank height.
For vapor space purge, all of the emissions were placed at the height of the manway.

Attachment 4

Emissions Calculations

Model Calculations

Summary tables of the parameters to use in the modeling are attached to the modeling report. The following sections detail the calculations used to determine emission rates for the modeling. Calculations for non-HTACs were completed using the same methods as benzene.

Annual Modeling Benzene – Tank Sources

Each IFR tank is modeled as two volume sources, as described in the report, with the worst-case emissions, as outlined below. Each VFR is modeled as a point source.

Vertical Fixed Roof Tanks

Tanks 28, 29, 30, 33, and 64 were modeled based on PTE emissions assuming distillate fuel oil 2, with both standing and working losses included.

IFR Tanks without Blendstock Storage

Tanks 31, 32, 39, and 120 were modeled based on the worst-case standing and working losses and landings as follows:

- Standing Losses – worst case of standing losses (gasoline)
- Working Losses – worst case benzene emissions from working losses (gasoline) plus crude working losses
- Example calculation for Tank 31 (total emissions, upper volume source is 80% of emissions and lower volume source is 20% of emissions):
    - Benzene emissions (lb/yr) = Benzene standing losses for gasoline (lb/yr) + Benzene working losses for gasoline (lb/yr) + Benzene working losses for crude (lb/yr) + Benzene losses due to landings (lb/yr) = 43.94 lb/yr + 6.56 lb/yr + 2.82 lb/yr + 30.36 lb/yr = 83.7 lb/yr

IFR Tanks with Blendstock Storage

IFR Tanks 114, 115, 117, 118, 119, and 121 – Modeled based on the worst-case standing and working losses and landings as follows:

- Standing Losses – worst case of standing losses (blendstock)
- Working Losses – worst case benzene emissions from working losses of gasoline and distillate (gasoline) plus blendstock working losses plus crude working losses
- Example calculation for Tank 117 (total emissions, upper volume source is 80% of emissions and lower volume source is 20% of emissions):
    - Benzene emissions (lb/yr) = Benzene standing losses for blendstock (lb/yr) + Benzene working losses for gasoline (lb/yr) + Benzene working losses for blendstock (lb/yr) + Benzene working losses for crude (lb/yr) + Benzene losses due to landings (lb/yr) = 20.99 lb/yr + 4.94 lb/yr + 1.45 lb/yr + 2.14 lb/yr + 30.36 lb/yr = 59.9 lb/yr

Tank Landings in Annual Model

The initial model iterations were completed assuming that the 22 tons per year of emissions from landings was evenly distributed between the tanks (2.2 tons per year per tank) and the worst-case speciation for July (0.69% benzene). Based on these initial runs, one additional run (annual run 8) was completed that distributed the landings only between the blendstock tanks because the maximum annual concentration was observed to be near this area of the facility.

Tank 130 – Product Water Tank

IFR tank 130 was modeled with standing and working losses as calculated in the PTE. It was also modeled as two volume sources, with 80% of emissions at a release height at the height of the tank and 20% of emissions at a release height of ½ the height of the tank.

Hourly Modeling Benzene – Tank Sources – Refill after a Landing

Each IFR tank is modeled as two volume sources, as described in the report, with the worst-case emissions, as outlined below. Each VFR is modeled as a point source. Vertical fixed roof tanks are modeled with the same emission rates as the annual model. IFRs are modeled assuming one tank is landing, with annual emission rates at the other IFR tanks. The worst-case hour of landing is used for the hourly model, with filling losses assumed as the worst-case. Landings for Tanks 31 and 32, though modeled in the PTE as ethanol, were recalculated for the purposes of the modeling with the worst-case product (gasoline) assumed.

The time to fill the tank is calculated based on a filling rate of 1500 bph provided by the terminal as a worst-case (rates range from 1000 to 1500 bph). Variable emission rates were used in the model. The landing emissions were calculated for each month for each tank depending on the worst-case product (gasoline or blendstock, depending on the tank).

The emission rate for July was entered into the Source Inputs screen for the tank being landed, and the ratios for the other months were calculated by dividing the benzene emissions for that month by the benzene emissions in the month of July. The calculations used for the landings in the month of July are provided at the end of this Attachment, and the ratios used for the variable emission rate entries in the model are provided with the modeling parameter attachment to the report.

Hourly Modeling Benzene – Tank Sources – Vapor Space Purge

Hourly cleaning calculations were also completed as part of the modeling to determine the worst-case hour. Variable emission rates were also used for the vapor space purge, with a similar method to that described for a refill after a landing. Emissions were modeled assuming a release height at the manway, which was measured in the field at the terminal. These heights are provided in the model parameters attachment to the model report.

Controlled cleaning results were calculated by taking 2% of the result from the uncontrolled model. An example run was completed for benzene to confirm that this technique was accurate.

Annual Modeling Benzene – Loading Calculations

For the annual model, iterative modeling was completed to determine worst-case loading scenarios based on the Operating Scenarios proposed for the facility. Detailed emission rates are provided in the attachments to the model report. An example calculation is provided below to demonstrate the method for calculating emission rates.

Example calculations for loading for Annual Run 1 is provided below. Example fugitive calculations are also provided. Calculations for other scenarios were completed using the same methods, with throughputs and emission limits adjusted as necessary depending on the assumptions for the specific model run. As described in the Permit Application submitted December 16, 2020, compliance with the emissions limits for refined product loading is determined based on the following equation:

Total Throughput of Refined Product (kgal) = (kgal loaded from OS #1) + (kgal loaded from OS#2/ 0.81) + (kgal loaded from OS#3/ 0.2) + (kgal loaded from OS#4/ 0.2) + (kgal loaded from OS#5/ 0.2)

The upper limit for the total throughput of refined product is 1,928,300 kgal. The Operating Scenarios are defined as follows:

#1: Loading at truck, rail and/or marine at 2 mg/L with vac assist

#2: Marine loading of inerted vessels at 2 mg/L (99.9%)

#3: Marine loading with VCUM1 (10 mg/L) with vac assist

#4: Truck loading with no vac assist (2 mg/L and 8 mg/L fugitives)

#5: Rail loading with no vac assist (2 mg/L and 8 mg/L fugitives)

Annual Run 1 Calculations

For the example calculations in this section, the following throughputs were assumed:

- 369,000,000 gallons of refined product and 380,000,000 gallons of blendstock at marine under Operating Scenario 1
- 879,300,000 gallons of refined product at truck under Operating Scenario 1
- 300,000,000 gallons of refined product at rail under Operating Scenario 1
- 450,000,000 gallons of crude at marine under OS#CRD1

The total throughput used for the compliance equation would be calculated as follows for refined products:

Total Throughput of Refined Product (kgal) = 1,928,300 kgal loaded from OS#1 + 0 kgal loaded from OS#2/ 0.81 + 0 kgal from OS#3/ 0.2 + 0 kgal from OS#4/ 0.2 + 0 kgal from OS#5/ 0.2

Total Throughput of Refined Product (kgal) = 1,928,300 kgal + 0 kgal + 0 kgal + 0 kgal + 0 kgal = 1,928,300 kgal

The total throughput for the crude compliance equation would be calculated as follows (limited to 450,000 kgal):

Total Throughput of crude oil (kgal) = (kgal loaded from OS#1) + (kgal loaded from OS#2/0.81) + (kgal loaded from OS#3/2) = 450,000 kgal loaded from OS#1 + 0 kgal loaded from OS#2/0.81 + 0 kgal loaded from OS#3/ 0.2 = 450,000 kgal

Truck Loading

Truck VRU calculation:

The following assumes that 879,300,000 gallons of refined product are loaded at the truck rack under Operating Scenario #1:

Emissions (lbs), Total VOCs = Refined Product Throughput at Truck Rack (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 879,300,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 14,674.5 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 14,674.5 lb/yr * 0.0046 = 67.5 lb/yr

Benzene emissions, lb/hr = 67.5 lb/yr * 1 yr/ 8760 hrs = 0.0077 lb/hr

Rail Loading

Rail VCU calculation:

The following assumes that 300,000,000 gallons of refined product are loaded at rail under Operating Scenario #1:

Emissions (lbs), Total VOCs = Refined Product Throughput at Rail (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 300,000,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 5006 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 5006 lb/yr * 0.0046 = 23 lb/yr

Benzene emissions, lb/hr = 23 lb/yr * 1 yr/ 8760 hrs = 0.0026 lb/hr

Marine Loading

VCUM1 calculation

The following assumes that 369,000,000 gallons of refined product and 380,000,000 gallons of blendstock are loaded at VCUM2 under Operating Scenario #1:

Emissions (lbs), Total VOCs = Refined Product Throughput at Marine (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg + Blendstock Throughput at Marine (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 369,000,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg + 380,000,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 12,499.2 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 12,499.9 lb/yr * 0.0046 = 57.5 lb/yr from refined product

The following assumes that 450,000,000 gallons crude are loaded at VCUM2 under Operating Scenario #CRD1:

Emissions (lbs), Total VOCs = Crude Throughput at Marine (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 450,000,000 gallons * 3.785 liters/gallon * 2 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 7510 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in crude = 7510 lb/yr * 0.0026 = 19.5 lb/yr from crude

Benzene emissions from refined product and crude, lb/hr = (57.5 lb/yr + 19.5 lb/yr) * 1 yr/ 8760 hrs = 0.0088 lb/hr

Example of Truck Fugitives calculation:

The following assumes that 163,437,000 gallons of refined product are loaded at the truck rack under Operating Scenario #4 as an example calculation (used for Annual Run 3):

Emissions (lbs), Total VOCs = Refined Product Throughput at Truck Rack (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 163,437,000 gallons * 3.785 liters/gallon * 8 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 10,910 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 10,910 lb/yr * 0.0046 = 50.2 lb/yr

Benzene emissions, lb/hr = 50.2 lb/yr * 1 yr/ 8760 hrs = 0.0057 lb/hr

Example of Rail Fugitives calculation:

The following assumes that 163,437,000 gallons of refined product are loaded at rail under Operating Scenario #5 as an example calculation (used for Annual Run 2):

Emissions (lbs), Total VOCs = Refined Product Throughput at Rail (gallons) * 3.785 liters/gallon * Overall Emission Rate (mg/liter) * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg

Emissions (lbs), Total VOCs = 163,437,000 gallons * 3.785 liters/gallon * 8 mg/l * 2.2046 lbs/Kg * 1 Kg / 1,000,000 mg = 10,910 lb/yr

Benzene emissions, lbs = Total VOCs * Benzene fraction in refined product (gasoline) = 10,910 lb/yr * 0.0046 = 50.2 lb/yr

Benzene emissions, lb/hr = 50.2 lb/yr * 1 yr/ 8760 hrs = 0.0057 lb/hr

Example of Marine Fugitives calculation

Refined product

The following calculation assumes a throughput of 900,000,000 gallons under OS#2 (used for Annual Run 2):

Emissions, lbs (Total VOCs) = Emission Factor (lb/1000 gallons) * Throughput in MM gallons * 1000 * % of Fugitive Emissions = 3.9 lb/1000 gallons * 900 MM gallons * 1000 * 0.1 % fugitives = 3,510 lbs

Benzene Emissions, lb/yr = Total VOCs * Benzene fraction in refined product (gasoline) = 3,510 lbs/yr * 0.0046 = 16.1 lb/yr

Benzene emissions, lb/hr = 16.1 lb/yr * 1 yr/ 8760 hrs = 0.0018 lb/hr

Benzene emissions, lb/hr/ft2 = 0.0018 lb/hr/ 55,294.2 ft2 (surface area as measured in aerial image) = 3.33E-8 lb/hr/ft2

Crude

The following calculation assumes a throughput of 364,500,000 gallons of crude under OS#CRD2 (used for Annual Run 2):

Emissions, lbs (Total VOCs) = Emission Factor (lb/1000 gallons) * Throughput in MM gallons * 1000 * % of Fugitive Emissions = 1.7996 lb/1000 gallons * 364.5 MM gallons * 1000 * 0.1 % fugitives = 656 lbs

Benzene Emissions, lb/yr = Total VOCs * Benzene fraction in refined product (gasoline) = 656 lbs/yr * 0.0026 = 1.71 lb/yr

Benzene emissions, lb/hr = 1.71 lb/yr * 1 yr/ 8760 hrs = 0.00019 lb/hr

Benzene emissions, lb/hr/ft^2 = 0.00019 lb/hr/ 55,294.2 ft^2 = 3.52E-9 lb/hr/ft^2

Hourly Modeling Benzene – Loading Calculations

Hourly emission rates for loading are provided in the report. Details on how these emission rates were calculated and how they were utilized in the model are provided below.

Truck Rack VRU Hourly Modeling

The hourly emission rate at the truck rack VRU is based on a maximum loading rate of 4000 gpm and an emissions limit of 2 mg/l to calculate the total VOC emissions. Benzene emissions are then calculated based on the average speciation for the year for gasoline (0.46%) as a worst-case average speciation. The calculation is as follows:

Maximum Short Term Loading Rate (liters/hr) = 4000 gallons/minute * 3.785 liters/gallon * 60 minutes/hr = 908,498.8 liters/hr

Total VOCs (g/hr) = 2 mg/l * 908,498.8 liters/hr * 1 g/ 1000 mg = 1,816.998 g/hr

Total VOCs (lb/hr) = 1,816.998 g/hr * 0.00220462 lb/ g = 4.006 lb/hr

Benzene (lb/hr) = Total VOCs * 0.0046 = 4.006 lb/hr * 0.0046 = 0.0184 lb/hr

Truck Fugitives Hourly Modeling

Truck fugitives, which are only part of Operating Scenario #4, were calculated based on an emission limit of 8 mg/l and a maximum short-term loading rate of 4000 gpm. The emissions calculation was completed using the same method as the truck rack VRU, with 8 mg/l used instead of 2 mg/l. Benzene emissions are calculated based on the average speciation for the year for gasoline (0.46%).

Rail VCU Hourly Modeling

The hourly emission rate at the truck rack VRU is based on a maximum loading rate of 4500 gpm and an emissions limit of 2 mg/l to calculate the total VOC emissions. Benzene emissions are then calculated based on the average speciation for the year for gasoline (0.46%). The emissions calculation was completed using the same method as the truck rack VRU, with 4500 gpm used as the maximum loading rate.

Rail Fugitives Hourly Modeling

Rail fugitives, which are only part of Operating Scenario #5, are calculated based on an emission limit of 8 mg/l and a maximum short-term loading rate of 4500 gpm. The emissions calculation was completed using the same method as the truck rack VRU, with 8 mg/l used instead of 2 mg/l. Benzene emissions are calculated based on the average speciation for the year for gasoline (0.46%).

Marine VCU (VCUM2) Hourly Modeling

VCUM2 was used in the hourly modeling given that the emissions are higher based on the higher loading rate compared to VCUM1. Benzene emissions are calculated based on the average speciation for the year for blendstock (0.46%) or crude (0.26%), depending on the assumptions in the model iteration. The maximum loading rate for VCUM2 used for the modeling was 25,000 barrels/hr (1,050,000 gallons/hr) with an emission rate of 2 mg/l. The example calculation for blendstock is provided below:

Maximum Short Term Loading Rate (liters/hr) = 1,050,000 gallons/hr * 3.785 liters/gallon = 3,794,250 l/hr

Total VOCs (g/hr) = 2 mg/l * 3,794,250 liters/hr * 1 g/ 1000 mg = 7,948.5 g/hr

Total VOCs (lb/hr) = 7,948.5 g/hr * 0.00220462 lb/ g = 17.5 lb/hr

Benzene (lb/hr) = Total VOCs * 0.0046 = 17.5 lb/hr * 0.0046 = 0.081 lb/hr

If one of the model iterations were to include only crude at VCUM2, the same calculation would be completed with 0.26% benzene used for the speciation for crude loading.

Marine Fugitives Hourly Modeling

Marine fugitives, which are part of Refined Operating Scenario #2 and Crude Operating Scenario #2 (CRD2), are calculated based on an emission factor of 3.9 lb/1000 gallons for an uncleaned barge for refined product and 25,000 barrels per hour as a worst-case short term loading rate. It is assumed that 99.9% of emissions go to the VCU with 0.1% emitted as fugitives. Benzene emissions are calculated based on the average speciation for the year for blendstock (0.46%) or crude (0.26%), depending on the assumptions in the model iteration. The example calculation for blendstock is provided below:

Total VOCs emitted as Fugitives (lb/hr) = Emission Factor * Volume Loaded kgal/hr * fraction emitted as fugitives = 3.9 lb/1000 gallons * 1,050 kgal/hr * 0.001 = 4.1 lb/hr

Benzene emitted as fugitives (lb/hr) = 4.1 lb/hr * 0.0046 = 0.0188 lb/hr

Benzene emitted as fugitives (lb/hr/ft^2) = 0.0188 lb/hr/ 55,294.2 ft^2 = 3.4E-7 lb/hr/ft^2

Annual Modeling Hydrogen Sulfide

A table of annual model inputs is provided with the modeling report. Tanks are modeled using the same parameters as for the benzene model, with only the IFRs included. Only marine loading is included for crude.

Tank Sources

For each of the IFR tanks, H_2S emissions were calculated by multiplying the total standing and working losses during crude storage by the vapor fraction of 0.00118 for H_2S. One crude landing per tank is assumed for the purposes of this modeling only.

Example calculation for tank 117:

H_2S emissions (lb/yr) = (Total standing losses during crude storage (lb/yr) + working losses during crude storage (lb/yr) + Total Landing Losses (lb/yr)) * vapor fraction of H_2S

H_2S emissions (lb/yr) = (2410.11 lb/yr + 357.34 lb/yr + 3402 lb/yr) * 0.00118 = 7.28 lb/yr (total emissions, upper volume source is 80% of this total and lower volume source is 20% of this total)

Loading calculations

Example calculation with vac assist only

The calculations provided in the PTE for VCUM2 will be used to derive the H_2S emissions for this point source for one of the model iterations, as follows:

VCUM2 H_2S Emissions (lb/yr) = Emissions in tons/yr * 2000 lbs/ton = 0.004 tons/yr * 2000 lbs/ton = 8 lb/yr

Example calculation for Crude Operating Scenario #2 with fugitives

A model iteration was completed assuming the maximum loading of crude under Operating Scenario 2 (CRD2) to calculate the emissions including barge fugitives. This calculation assumed that no crude loading occurs under the other 2 model scenarios as a worst-case for fugitive emissions.

Control device emission rate (lb/1000 gallons) = Emission rate in mg/l * 0.00834540445 (conversion factor) = 2 mg/l * 0.00834540445 = 0.0167 lb/1000 gallons

Emission factor (in lb/1000 gallons) = 1.7975 (see Marine Loading – Crude Oil in PTE)

VCUM2 Total VOC Emissions (lb/yr) = Control device emission rate (lb/1000 gallons) * Throughput in kgal = 0.0167 lb/1000 gallons * 364,500 kgal = 6,087 lb/yr

VCUM2 H_2S Emissions (lb/yr) = Total VOC Emissions in lb/yr * vapor fraction of H_2S = 6,087 lb/yr * 0.00118 = 7.18 lb/yr

Barge Fugitive Total VOC Emissions (lb/yr) = Emission factor (lb/1000 gallons) * Throughput in kgal * Fraction of emissions as fugitives = 1.7975 lb/1000 gallons * 364,500 kgal * 0.001 = 655.2 lb/yr

Barge Fugitive H_2S Emissions (lb/yr) = Total VOC Emissions in lb/yr * vapor fraction of H_2S = 655.2 lb/yr * 0.00118 = 0.773 lb/yr

Barge Fugitive H_2S Emissions (lb/hr) = H_2S Emissions in lb/yr * 1 yr/ 8760 hrs = 0.773 lb/yr * 1/8760 = 8.83E-5 lb/hr

Barge Fugitive H_2S Emissions (lb/hr/ft^2) = H_2S Emissions in lb/hr/ Surface Area of Barge in ft^2 = 8.83E-5 lb/hr/ 55,294.2 ft^2 = 1.6E-9 lb/hr/ft^2

Hourly Modeling Hydrogen Sulfide

Tank Sources

IFRs were modeled assuming one tank was landing, with annual emission rates at the other IFR tanks. As described in the report, tanks 32 and 117 landings were modeled since they were the worst case gasoline and blendstock tanks from the benzene hourly modeling, respectively. The worst-case hour of landing is used for the hourly model, with filling losses assumed as the worst-case. The time for filling was calculated based on a filling rate of 1500 bph. Variable emission rates were used for the H_2S model, with a similar approach to the calculation for benzene. The specific ratios used for each month are provided in the model parameters attachment to the report.

Tank landing emissions were calculated for crude tanks only for the purposes of the hourly H_2S modeling and are provided at the end of this attachment. Crude landings were not included for the benzene modeling because gasoline speciation results in a higher benzene content so that would be considered the worst-case.

For each tank that is landed, the emissions were calculated as follows:

H_2S Emissions During Landing (lb/hr) = Filling losses for one landing * H_2S vapor fraction/ hours for filling

<u>Example calculation for Tank 117 (Assuming 1500 bph filling rate):</u>

H_2S Emissions During Landing (lb/hr) = 1385 lb/landing * 0.00118 / 4.51 hours = 0.36 lb/hr

Loading Sources

Total VOC emissions were calculated in the same way for the hourly H_2S modeling as for the hourly benzene model, with the vapor fraction of H_2S of 0.00118 applied.

July Total VOC Landing and Cleaning Calculations for IFRs
Used in Benzene and non-HTAC Modeling

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**1,806.62**	lb/event
		0.903	ton/event
Product in tank during landing:		Gasoline - RVP 9	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, *h d* (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s$	**L_{SL}**	**678.94**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.1848	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	5.774	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.54	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,127.68**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	5.774	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.1848**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.2440	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.244**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.42	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	5.18	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**33,747.58**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.54**	
Vapor Pressure at TAA for month	P_{VA}	5.774	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**10,628.61**	**lb/event**
		5.3143	**ton/event**

Product in tank prior to cleaning		Gasoline - RVP 9	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	L_P	2357.875	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	5.774	
Volume of vapor space	V_V	70,563.12	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	L_{CV}	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*WI		129062.5	
Cvmax = P_{VA}/Pa		0.396813954	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	P_{VA}	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	V_V	**70,563.12**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	L_{SL}	**947.34**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.1848	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	5.774	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.36	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_s	L_{FL}	**707.36**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	5.774	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.1848**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.2440	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.244**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.42	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	5.18	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3	
L_P	1180.562	1181.720	
S *	**0.25**	**0.25**	*S is based on fixed roof Eq. 4-6 < 1day
H_l	0.242	0.24	
V_V	**70,660.38**	**70,729.65**	
h_v	5.76	5.76	
h_{d2}	6.00	6.00	

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD²/4))+(0.0		**6.31**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	125	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		1578	ft3
Vertical distance from bottom shell to the liquid surface in cone bot	h_p	0.4	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.4	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**1,806.62**	lb/event
		0.903	ton/event
Product in tank during landing:		Gasoline - RVP 9	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d$*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s	**L_{SL}**	**678.94**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.1848	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	5.774	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.54	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,127.68**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	5.774	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.1848**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.2440	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.244**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.42	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	5.18	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**33,747.58**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.54**	
Vapor Pressure at TAA for month	P_{VA}	5.774	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units		Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**10,628.61**	**lb/event**				
		5.3143	**ton/event**				

Product in tank prior to cleaning		Gasoline - RVP 9	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	$\mathbf{L_P}$	2357.875	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	5.774	
Volume of vapor space	V_V	70,563.12	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	$\mathbf{L_{CV}}$	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*WI		129062.5	
Cvmax = P_{VA}/Pa		0.39681395	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	$\mathbf{P_{VA}}$	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	$\mathbf{V_V}$	**70,563.12**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	$\mathbf{L_{SL}}$	**947.34**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.1848	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	5.774	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ten	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.36	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_{s}	$\mathbf{L_{FL}}$	**707.36**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	5.774	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.1848**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.2440	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensio	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.244**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.42	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	5.18	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3	
$\mathbf{L_P}$	1180.562	1181.720	
S *	**0.25**	**0.25**	*S is based on fixed roof Eq. 4-6 < 1day
H_l	0.242	0.24	
$\mathbf{V_V}$	**70,660.38**	**70,729.65**	
h_v	5.76	5.76	
h_{d2}	6.00	6.00	

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.0		**6.31**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	125	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		1578	ft3
Vertical distance from bottom shell to the liquid surface in cone bot	h_p	0.4	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.4	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**2,174.38**	lb/event
		1.087	ton/event
Product in tank during landing:		Gasoline - RVP 9	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d$*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s	**L_{SL}**	**1046.70**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.2849	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	5.774	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.54	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,127.68**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	5.774	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.2849**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	1.9184	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.80	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	4.88	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	540.16	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	522.54	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	35.23	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**33,747.58**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.54**	
Vapor Pressure at TAA for month	P_{VA}	5.774	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**11,141.97**	**lb/event**
		5.5710	**ton/event**

Product in tank prior to cleaning		Gasoline - RVP 9	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	**L_P**	2357.875	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	5.774	
Volume of vapor space	V_V	70,563.12	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	**L_{CV}**	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*WI		129062.5	
Cvmax = P_{VA}/Pa		0.39681395	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**5.774**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.756	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	5,315.1	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	**V_V**	**70,563.12**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	**L_{SL}**	**1460.49**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.2849	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	5.774	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.36	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_s	**L_{FL}**	**707.36**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	5.774	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.2849**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	1.9184	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	5.7736	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.58	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	6.80	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	4.88	psia
Average daily max liquid surface temp TLX = TAA	TLX	540.16	°R
Average daily min liquid surface temp TLN = TAA	TLN	522.54	°R
Vapor Pressure Equation Constant A	A	11.756	
Vapor Pressure Equation Constant B	B	5,315	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	35.23	

Additional Purge Emissions

	Day 2	Day 3	
L_P	1180.630	1181.856	
S *	**0.25**	**0.25**	*S is based on fixed roof Eq. 4-6 < 1day
H_l	0.242	0.24	
V_V	**70,664.44**	**70,737.79**	
h_v	5.76	5.76	
h_{d2}	6.00	6.00	

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.0		**6.31**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	125	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		1578	ft3
Vertical distance from bottom shell to the liquid surface in cone bot	h_p	0.4	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.4	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**5,124.27**	lb/event
		2.562	ton/event
Product in tank during landing:		Gasoline - RVP 15	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s$	**L_{SL}**	**3316.82**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.7535	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	10.041	psia
Volume of the vapor space	V_V	31101.77	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.41	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,807.44**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	10.041	psia
Volume of the vapor space	V_V	31101.77	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv/	**KE**	**0.7535**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	3.0983	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**3.098**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.68	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.59	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	540.16	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	522.54	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	35.23	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**31,101.77**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.41**	
Vapor Pressure at TAA for month	P_{VA}	10.041	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**17,166.32**	**lb/event**
		8.5832	**ton/event**

	Symbol		Units
Product in tank prior to cleaning	**Gasoline - RVP 15**		
Month the cleaning occurred:	**July**		
Calibration Gas		**Propane (C3)**	
Duration of the continued forced ventilation	n_{CV}	**3**	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	**6**	ft
Number of days standing idle before cleaning	n_d	**3**	days
Height of the stock liquid	h_l	**0.250**	ft
Average ventilation rate during continued forced ventilation	Q_V	**10000**	ft^3/min
Hours per day of force ventilation	t_V	**10**	hrs/day
Average LEL Reading	LEL	**10**	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	$\mathbf{L_P}$	3779.201	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	10.041	
Volume of vapor space	V_V	65,030.97	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	$\mathbf{L_{CV}}$	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = $5.9*D^2*(hl)*Wl$		118944	
Cvmax = P_{VA}/Pa		0.690118501	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	$\mathbf{P_{VA}}$	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	$\mathbf{V_V}$	**65,030.97**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	$\mathbf{L_{SL}}$	**4208.03**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.7535	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	65030.97	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.25	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_{sf}	$\mathbf{L_{FL}}$	**1,133.76**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	65030.97	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.7535**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	3.0983	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.58	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**3.098**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.68	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.59	psia
Average daily max liquid surface temp TLX = TAA	TLX	540.16	°R
Average daily min liquid surface temp TLN = TAA	TLN	522.54	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	35.23	

Additional Purge Emissions

	Day 2	Day 3
$\mathbf{L_P}$	1894.159	1897.415
S *	**0.25**	**0.25**
H_l	0.236	0.23
$\mathbf{V_V}$	**65,187.85**	**65,299.93**
h_v	5.76	5.77
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1day

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.0		**6.29**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	120	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		1396	ft3
Vertical distance from bottom shell to the liquid surface in cone bo	h_p	0.4	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.4	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**8,006.67**	lb/event
		4.003	ton/event
Product in tank during landing:		**Gasoline - RVP 15**	
Month the landing occurred:		**July**	
Number of days the tank stays idle	n_d	**3**	days
Height of floating roof deck, *h_d* (ft) (assume 3 ft if unknown)	h_d	**3.00**	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d$*KE*$((P_{VA}*V_V)/R*Tv))*M_V*K_s$	**L_{SL}**	**5182.54**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.7535	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	10.041	psia
Volume of the vapor space	V_V	48596.51	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.41	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**2,824.13**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	10.041	psia
Volume of the vapor space	V_V	48596.51	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.7535**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	3.0983	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**3.098**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.68	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.59	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	540.16	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	522.54	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	35.23	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**48,596.51**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.41**	
Vapor Pressure at TAA for month	P_{VA}	10.041	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**24,427.99**	**lb/event**
		12.2140	**ton/event**

Product in tank prior to cleaning		Gasoline - RVP 15	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	**L_P**	5905.001	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	10.041	
Volume of vapor space	V_V	101,610.89	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	**L_{CV}**	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		185850	
Cvmax = P_{VA}/Pa		0.690118501	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	**V_V**	**101,610.89**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	**L_{SL}**	**6575.05**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.7535	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	101610.89	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.25	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}$$V_V$/R$T_V$)$M_V$($C_{s}$	**L_{FL}**	**1,771.50**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	101610.89	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/T	**KE**	**0.7535**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	3.0983	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.58	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**3.098**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.68	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.59	psia
Average daily max liquid surface temp TLX = TAA	TLX	540.16	°R
Average daily min liquid surface temp TLN = TAA	TLN	522.54	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	35.23	

Additional Purge Emissions

	Day 2	Day 3
L_P	2959.072	2963.609
S *	**0.25**	**0.25**
H_l	0.237	0.23
V_V	**101,837.06**	**101,993.21**
h_v	5.76	5.77
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1day

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD²/4))+(0.0		**6.37**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	150	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		2727	ft3
Vertical distance from bottom shell to the liquid surface in cone bot	h_p	0.5	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.5	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**2,749.89**	lb/event
		1.375	ton/event
Product in tank during landing:		**Component (Average RVP 14.33)**	
Month the landing occurred:		**July**	
Number of days the tank stays idle	n_d	**3**	days
Height of floating roof deck, *h_d* (ft) (assume 3 ft if unknown)	h_d	**3.00**	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d$*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s	**L_{SL}**	**1419.15**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4243	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	9.519	psia
Volume of the vapor space	V_V	26134.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mol
Saturation factor	K_S	0.42	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,330.74**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	9.519	psia
Volume of the vapor space	V_V	26134.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**9.519**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.610	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,971.7	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv/	**KE**	**0.4243**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.9182	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	9.5193	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	10.52	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.60	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.610	
Vapor Pressure Equation Constant B	B	4,972	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**26,134.12**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.42**	
Vapor Pressure at TAA for month	P_{VA}	9.519	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**12,477.30**	**lb/event**
		6.2387	**ton/event**

Product in tank prior to cleaning		Component (Average RVP 14.33)	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	**L_P**	2782.454	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	9.519	
Volume of vapor space	V_V	54,644.08	
Stock vapor molecular weight	M_V	61	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	**L_{CV}**	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		99946	
Cvmax = P_{VA}/Pa		0.654248923	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**9.519**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.610	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,971.7	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	**V_V**	**54,644.08**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	**L_{SL}**	**1816.02**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4243	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	9.519	psia
Volume of the vapor space	V_V	54644.08	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mol
Standing idle saturation factor	K_S	0.26	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}$$V_V$/R$T_V$)$M_V$($C_{sf}$	**L_{FL}**	**834.74**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	9.519	psia
Volume of the vapor space	V_V	54644.08	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ten	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	61	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.4243**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.9182	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	9.5193	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensio	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	10.52	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.60	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.610	
Vapor Pressure Equation Constant B	B	4,972	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3
L_P	1394.136	1396.204
S *	**0.25**	**0.25**
H_l	0.238	0.23
V_V	**54,758.31**	**54,839.55**
h_v	5.76	5.77
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1day

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.01 in		**6.27**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	110	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		1075	ft3
Vertical distance from bottom shell to the liquid surface in cone bottom	h_p	0.4	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.4	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**2,272.64**	lb/event
		1.136	ton/event
Product in tank during landing:		Component (Average RVP 14.33)	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, *h d* (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d{*}KE{*}((P_{VA}{*}V_V)/R{*}Tv)){*}M_V{*}K_s$	**L_{SL}**	**1172.85**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4243	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	9.519	psia
Volume of the vapor space	V_V	21598.45	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mol
Saturation factor	K_S	0.42	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,099.78**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	9.519	psia
Volume of the vapor space	V_V	21598.45	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**9.519**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.610	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,971.7	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.4243**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.9182	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	9.5193	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	10.52	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.60	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.610	
Vapor Pressure Equation Constant B	B	4,972	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**21,598.45**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.42**	
Vapor Pressure at TAA for month	P_{VA}	9.519	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**11,050.52**	**lb/event**
		5.5253	**ton/event**

	Symbol		Units
Product in tank prior to cleaning	Component (Average RVP 14.33)		
Month the cleaning occurred:	July		
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	L_P	2299.549	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	9.519	
Volume of vapor space	V_V	45,160.39	
Stock vapor molecular weight	M_V	61	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	L_{CV}	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		82600	
Cvmax = P_{VA}/Pa		0.654248923	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	P_{VA}	**9.519**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.610	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,971.7	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	V_V	**45,160.39**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	L_{SL}	**1500.84**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4243	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	9.519	psia
Volume of the vapor space	V_V	45160.39	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mol
Standing idle saturation factor	K_S	0.26	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_{s}	L_{FL}	**689.86**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	9.519	psia
Volume of the vapor space	V_V	45160.39	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	61	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.4243**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.9182	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	9.5193	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	10.52	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.60	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.610	
Vapor Pressure Equation Constant B	B	4,972	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3
L_P	1152.327	1154.185
S *	**0.25**	**0.25**
H_l	0.237	0.23
V_V	**45,260.66**	**45,333.64**
h_v	5.76	5.77
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1day

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.0		**6.25**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	100	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		808	ft3
Vertical distance from bottom shell to the liquid surface in cone bo	h_p	0.3	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.3	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**1,454.49**	lb/event
		0.727	ton/event
Product in tank during landing:		**Component (Average RVP 14.33)**	
Month the landing occurred:		**July**	
Number of days the tank stays idle	n_d	**3**	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	**3.00**	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d$*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s	**L_{SL}**	**750.63**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4243	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	9.519	psia
Volume of the vapor space	V_V	13823.01	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mol
Saturation factor	K_S	0.42	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**703.86**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	9.519	psia
Volume of the vapor space	V_V	13823.01	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**9.519**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.610	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,971.7	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.4243**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.9182	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	9.5193	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	10.52	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.60	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.610	
Vapor Pressure Equation Constant B	B	4,972	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**13,823.01**	ft^3
Height of vapor space under landed deck ($h_v=h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.42**	
Vapor Pressure at TAA for month	P_{VA}	9.519	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**8,604.61**	**lb/event**
		4.3023	**ton/event**

Product in tank prior to cleaning		Component (Average RVP 14.33)	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	$\mathbf{L_P}$	1471.711	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	9.519	
Volume of vapor space	V_V	28,902.65	
Stock vapor molecular weight	M_V	61	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	$\mathbf{L_{CV}}$	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		52864	
Cvmax = P_{VA}/Pa		0.654248923	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	$\mathbf{P_{VA}}$	**9.519**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.610	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,971.7	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	$\mathbf{V_V}$	**28,902.65**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	$\mathbf{L_{SL}}$	**960.54**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4243	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	9.519	psia
Volume of the vapor space	V_V	28902.65	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	61	lb/lb-mol
Standing idle saturation factor	K_S	0.26	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_{sf}	$\mathbf{L_{FL}}$	**441.51**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	9.519	psia
Volume of the vapor space	V_V	28902.65	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	61	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/T	**KE**	**0.4243**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	1.9182	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	9.5193	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**1.918**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	10.52	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	8.60	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.610	
Vapor Pressure Equation Constant B	B	4,972	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3	
$\mathbf{L_P}$	737.798	739.297	
S *	**0.25**	**0.25**	*S is based on fixed roof Eq. 4-6 < 1day
H_l	0.235	0.22	
$\mathbf{V_V}$	**28,978.95**	**29,037.81**	
h_v	5.77	5.78	
h_{d2}	6.00	6.00	

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD²/4))+(0.0		**6.20**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	80	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		414	ft3
Vertical distance from bottom shell to the liquid surface in cone bo	h_p	0.3	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.3	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	L_{TL}	**1,759.55**	lb/event
		0.880	ton/event
Product in tank during landing:		Gasoline - RVP 15	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s$	L_{SL}	**956.25**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4888	
True vapor pressure of stock liquid (avg. ambient temp. of month landing oc	P_{VA}	10.041	psia
Volume of the vapor space	V_V	13823.01	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.41	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	L_{FL}	**803.31**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing oc	P_{VA}	10.041	psia
Volume of the vapor space	V_V	13823.01	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	P_{VA}	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.4888**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0096	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.010**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.09	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	9.08	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	V_V	**13,823.01**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.41**	
Vapor Pressure at TAA for month	P_{VA}	10.041	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**9,336.80**	**lb/event**
		4.6684	**ton/event**

	Symbol		Units
Product in tank prior to cleaning		Gasoline - RVP 15	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	$\mathbf{L_P}$	1679.645	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	10.041	
Volume of vapor space	V_V	28,902.65	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	$\mathbf{L_{CV}}$	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		52864	
Cvmax = P_{VA}/Pa		0.6901185	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	$\mathbf{P_{VA}}$	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	$\mathbf{V_V}$	**28,902.65**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	$\mathbf{L_{SL}}$	**1213.18**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4888	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	28902.65	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.25	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}$$V_V$/R$T_V$)$M_V$($C_{s}$	$\mathbf{L_{FL}}$	**503.89**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	28902.65	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.4888**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0096	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.010**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.09	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	9.08	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3	
$\mathbf{L_P}$	842.241	844.082	
S *	**0.25**	**0.25**	*S is based on fixed roof Eq. 4-6 < 1day
H_l	0.233	0.22	
$\mathbf{V_V}$	**28,985.90**	**29,049.24**	
h_v	5.77	5.78	
h_{d2}	6.00	6.00	

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.0		**6.20**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	80	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		414	ft3
Vertical distance from bottom shell to the liquid surface in cone bot	h_p	0.3	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.3	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**6,185.93**	lb/event
		3.093	ton/event
Product in tank during landing:		Gasoline - RVP 15	
Month the landing occurred:		July	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d{*}KE{*}((P_{VA}{*}V_V)/R{*}Tv)){*}M_V{*}K_s$	**L_{SL}**	**3361.80**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4888	
True vapor pressure of stock liquid (avg. ambient temp. of month landing oc	P_{VA}	10.041	psia
Volume of the vapor space	V_V	48596.51	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Saturation factor	K_S	0.41	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**2,824.13**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing oc	P_{VA}	10.041	psia
Volume of the vapor space	V_V	48596.51	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.4888**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0096	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.010**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.09	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	9.08	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**48,596.51**	ft^3
Height of vapor space under landed deck ($h_v=h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.41**	
Vapor Pressure at TAA for month	P_{VA}	10.041	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**22,116.43**	**lb/event**
		11.0582	**ton/event**

	Symbol		Units
Product in tank prior to cleaning		**Gasoline - RVP 15**	
Month the cleaning occurred:		**July**	
Calibration Gas		**Propane (C3)**	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	**0.250**	ft
Average ventilation rate during continued forced ventilation	Q_V	**10000**	ft^3/min
Hours per day of force ventilation	t_V	**10**	hrs/day
Average LEL Reading	LEL	**10**	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	$\mathbf{L_P}$	5905.001	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	10.041	
Volume of vapor space	V_V	101,610.89	
Stock vapor molecular weight	M_V	66	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	$\mathbf{L_{CV}}$	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		185850	
Cvmax = P_{VA}/Pa		0.690118501	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	$\mathbf{P_{VA}}$	**10.041**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	11.600	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,937.9	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	$\mathbf{V_V}$	**101,610.89**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	$\mathbf{L_{SL}}$	**4265.09**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.4888	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	101610.89	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	66	lb/lb-mol
Standing idle saturation factor	K_S	0.25	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V$/RT_V)M_V(C_{sf}	$\mathbf{L_{FL}}$	**1,771.50**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	10.041	psia
Volume of the vapor space	V_V	101610.89	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	66	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.4888**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0096	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	10.0412	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensio	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.010**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	11.09	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	9.08	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	11.600	
Vapor Pressure Equation Constant B	B	4,938	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3	
$\mathbf{L_P}$	2958.540	2962.545	
S *	**0.25**	**0.25**	*S is based on fixed roof Eq. 4-6 < 1day
H_l	0.238	0.23	
$\mathbf{V_V}$	**101,818.76**	**101,956.59**	
h_v	5.76	5.77	
h_{d2}	6.00	6.00	

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD^2/4))+(0.0		**6.37**	**ft**
Tank cone bottom slope	s	**0.02**	ft/ft
Diameter	D	150	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)^3))/(sD/2)^2)		2727	ft3
Vertical distance from bottom shell to the liquid surface in cone bo	h_p	0.5	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.5	ft
Height of liquid in bottom of cone		**0**	ft

Speciation for Landing and Cleaning Calculations
Used in Benzene and non-HTAC Modeling

Landing and Cleaning Speciation - Blendstock RVP 15

Nearest US Location Albany, NY

MONTH January

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant A		A	11.60	
Vapor Pressure Equation Constant B		B	4937.93	°R
Daily total solar insolation on a horizontal surface		**I**	532.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**483.25**	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient		T_{AN}	475.80	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	3.982	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.03374	
benzene	78.11	66	0.00283	
2,2,4 TMP	114.23	66	0.00276	
toluene	92.14	66	0.00263	
ethylbenzene	106.17	66	0.00019	
xylenes	106.17	66	0.00057	
cumene	120.19	66	0.00002	
naphthalene	128.17	66	5.90E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.102880	3.982	0.0258383	
benzene	0.009537	3.982	0.00240	
2,2,4 TMP	0.006360	3.982	0.00160	
toluene	0.007515	3.982	0.00189	
ethylbenzene	0.000465	3.982	0.00012	
xylenes	0.001405	3.982	0.00035	
cumene	4.25E-05	3.982	0.00001	
naphthalene	1.21E-06	3.982	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.68
benzene	6.906	1211	220.79	0.39
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

MONTH February

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	789.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**485.80**	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.201	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.03459	
benzene	78.11	66	0.00292	
2,2,4 TMP	114.23	66	0.00286	
toluene	92.14	66	0.00274	
ethylbenzene	106.17	66	0.00020	
xylenes	106.17	66	0.00060	
cumene	120.19	66	0.00002	
naphthalene	128.17	66	6.42E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.111301	4.201	0.02649	
benzene	0.010373	4.201	0.00247	
2,2,4 TMP	0.006940	4.201	0.00165	
toluene	0.008255	4.201	0.00197	
ethylbenzene	0.000518	4.201	0.00012	
xylenes	0.001564	4.201	0.00037	
cumene	4.77E-05	4.201	0.00001	
naphthalene	1.39E-06	4.201	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.73
benzene	6.906	1211	220.79	0.42
2,2,4 TMP	6.812	1257.8	220.74	0.21
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

MONTH March

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1096.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**494.80**	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.054	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.03766	
benzene	78.11	66	0.00324	
2,2,4 TMP	114.23	66	0.00321	
toluene	92.14	66	0.00315	
ethylbenzene	106.17	66	0.00024	
xylenes	106.17	66	0.00072	
cumene	120.19	66	0.00003	
naphthalene	128.17	66	8.57E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.145768	5.054	0.02884	
benzene	0.013835	5.054	0.00274	
2,2,4 TMP	0.009362	5.054	0.00185	
toluene	0.011394	5.054	0.00225	
ethylbenzene	0.000745	5.054	0.00015	
xylenes	0.002256	5.054	0.00045	
cumene	7.07E-05	5.054	0.00001	
naphthalene	2.23E-06	5.054	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.96
benzene	6.906	1211	220.79	0.56
2,2,4 TMP	6.812	1257.8	220.74	0.28
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
cumene	6.929	1455.8	207.2	0.02
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Blendstock RVP 15

MONTH April

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	6.482	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.04207	
benzene	78.11	66	0.00371	
2,2,4 TMP	114.23	66	0.00372	
toluene	92.14	66	0.00377	
ethylbenzene	106.17	66	0.00030	
xylenes	106.17	66	0.00091	
cumene	120.19	66	0.00003	
naphthalene	128.17	66	1.25E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.208854	6.482	0.03222	
benzene	0.020305	6.482	0.00313	
2,2,4 TMP	0.013947	6.482	0.00215	
toluene	0.017503	6.482	0.00270	
ethylbenzene	0.001209	6.482	0.00019	
xylenes	0.003673	6.482	0.00057	
cumene	1.19E-04	6.482	0.00002	
naphthalene	4.18E-06	6.482	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.38
benzene	6.906	1211	220.79	0.83
2,2,4 TMP	6.812	1257.8	220.74	0.41
toluene	7.017	1377.6	222.64	0.22
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
cumene	6.929	1455.8	207.2	0.03
naphthalene	7.146	1831.6	211.82	0.00

MONTH May

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	7.888	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.04580	
benzene	78.11	66	0.00411	
2,2,4 TMP	114.23	66	0.00418	
toluene	92.14	66	0.00433	
ethylbenzene	106.17	66	0.00036	
xylenes	106.17	66	0.00110	
cumene	120.19	66	0.00004	
naphthalene	128.17	66	1.68E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.276652	7.888	0.03507	
benzene	0.027398	7.888	0.00347	
2,2,4 TMP	0.019042	7.888	0.00241	
toluene	0.024480	7.888	0.00310	
ethylbenzene	0.001763	7.888	0.00022	
xylenes	0.005372	7.888	0.00068	
cumene	1.79E-04	7.888	0.00002	
naphthalene	6.83E-06	7.888	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.83
benzene	6.906	1211	220.79	1.11
2,2,4 TMP	6.812	1257.8	220.74	0.57
toluene	7.017	1377.6	222.64	0.31
ethylbenzene	6.95	1419.3	212.61	0.10
xylenes	7.009	1462.3	215.11	0.08
cumene	6.929	1455.8	207.2	0.04
naphthalene	7.146	1831.6	211.82	0.00

MONTH June

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	9.374	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.04924	
benzene	78.11	66	0.00449	
2,2,4 TMP	114.23	66	0.00461	
toluene	92.14	66	0.00488	
ethylbenzene	106.17	66	0.00042	
xylenes	106.17	66	0.00128	
cumene	120.19	66	0.00005	
naphthalene	128.17	66	2.17E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.353536	9.374	0.03771	
benzene	0.035575	9.374	0.00379	
2,2,4 TMP	0.024978	9.374	0.00266	
toluene	0.032799	9.374	0.00350	
ethylbenzene	0.002448	9.374	0.00026	
xylenes	0.007480	9.374	0.00080	
cumene	2.55E-04	9.374	0.00003	
naphthalene	1.05E-05	9.374	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	2.33
benzene	6.906	1211	220.79	1.45
2,2,4 TMP	6.812	1257.8	220.74	0.74
toluene	7.017	1377.6	222.64	0.42
ethylbenzene	6.95	1419.3	212.61	0.14
xylenes	7.009	1462.3	215.11	0.12
cumene	6.929	1455.8	207.2	0.06
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Blendstock RVP 15

MONTH July

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant A		A	11.60	
Vapor Pressure Equation Constant B		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		$\mathbf{T_{AA}}$	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		$\mathbf{P_{vA}}$	10.041	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$\mathbf{Z_{Vi} = y_i M_i / M_V}$			
	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	
hexane	86.18	66	0.05066	
benzene	78.11	66	0.00465	
2,2,4 TMP	114.23	66	0.00479	
toluene	92.14	66	0.00512	
ethylbenzene	106.17	66	0.00045	
xylenes	106.17	66	0.00137	
cumene	120.19	66	0.00005	
naphthalene	128.17	66	2.40E-06	
Vapor Mole Fraction Eq. 40-5 $\mathbf{y_i = P_i / P_{VA}}$				
	$\mathbf{P_i = P_{VAI}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	
hexane	0.389589	10.041	0.03880	
benzene	0.039450	10.041	0.00393	
2,2,4 TMP	0.027811	10.041	0.00277	
toluene	0.036827	10.041	0.00367	
ethylbenzene	0.002788	10.041	0.00028	
xylenes	0.008526	10.041	0.00085	
cumene	2.93E-04	10.041	0.00003	
naphthalene	1.24E-05	10.041	0.00000	
Liquid Mole Fraction Eq. 40-4 $\mathbf{x_i = (Z_{Li}M_L)/M_i}$				
	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure $\mathbf{P_{VAi}=(0.019337)10\text{^}(A-(B/(TLA+C)))}$				
	A	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	6.878	1171.5	224.37	2.57
benzene	6.906	1211	220.79	1.60
2,2,4 TMP	6.812	1257.8	220.74	0.83
toluene	7.017	1377.6	222.64	0.47
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
cumene	6.929	1455.8	207.2	0.07
naphthalene	7.146	1831.6	211.82	0.00

MONTH August

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant A		A	11.60	
Vapor Pressure Equation Constant B		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		$\mathbf{T_{AA}}$	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		$\mathbf{P_{vA}}$	9.832	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$\mathbf{Z_{Vi} = y_i M_i / M_V}$			
	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	
hexane	86.18	66	0.05023	
benzene	78.11	66	0.00460	
2,2,4 TMP	114.23	66	0.00474	
toluene	92.14	66	0.00505	
ethylbenzene	106.17	66	0.00044	
xylenes	106.17	66	0.00134	
cumene	120.19	66	0.00005	
naphthalene	128.17	66	2.32E-06	
Vapor Mole Fraction Eq. 40-5 $\mathbf{y_i = P_i / P_{VA}}$				
	$\mathbf{P_i = P_{VAI}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	
hexane	0.378190	9.832	0.03846	
benzene	0.038222	9.832	0.00389	
2,2,4 TMP	0.026912	9.832	0.00274	
toluene	0.035545	9.832	0.00362	
ethylbenzene	0.002679	9.832	0.00027	
xylenes	0.008191	9.832	0.00083	
cumene	2.80E-04	9.832	0.00003	
naphthalene	1.18E-05	9.832	0.00000	
Liquid Mole Fraction Eq. 40-4 $\mathbf{x_i = (Z_{Li}M_L)/M_i}$				
	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure $\mathbf{P_{VAi}=(0.019337)10\text{^}(A-(B/(TLA+C)))}$				
	A	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.55
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.45
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
cumene	6.929	1455.8	207.2	0.07
naphthalene	7.146	1831.6	211.82	0.00

MONTH September

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant A		A	11.60	
Vapor Pressure Equation Constant B		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		$\mathbf{T_{AA}}$	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		$\mathbf{P_{vA}}$	8.509	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$\mathbf{Z_{Vi} = y_i M_i / M_V}$			
	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	
hexane	86.18	66	0.04729	
benzene	78.11	66	0.00427	
2,2,4 TMP	114.23	66	0.00436	
toluene	92.14	66	0.00457	
ethylbenzene	106.17	66	0.00039	
xylenes	106.17	66	0.00117	
cumene	120.19	66	0.00004	
naphthalene	128.17	66	1.88E-06	
Vapor Mole Fraction Eq. 40-5 $\mathbf{y_i = P_i / P_{VA}}$				
	$\mathbf{P_i = P_{VAI}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	
hexane	0.308169	8.509	0.03622	
benzene	0.030735	8.509	0.00361	
2,2,4 TMP	0.021457	8.509	0.00252	
toluene	0.027843	8.509	0.00327	
ethylbenzene	0.002037	8.509	0.00024	
xylenes	0.006215	8.509	0.00073	
cumene	2.09E-04	8.509	0.00002	
naphthalene	8.24E-06	8.509	0.00000	
Liquid Mole Fraction Eq. 40-4 $\mathbf{x_i = (Z_{Li}M_L)/M_i}$				
	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure $\mathbf{P_{VAi}=(0.019337)10\text{^}(A-(B/(TLA+C)))}$				
	A	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	6.878	1171.5	224.37	2.03
benzene	6.906	1211	220.79	1.25
2,2,4 TMP	6.812	1257.8	220.74	0.64
toluene	7.017	1377.6	222.64	0.36
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.10
cumene	6.929	1455.8	207.2	0.05
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Blendstock RVP 15

MONTH October

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.773	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.04289	
benzene	78.11	66	0.00379	
2,2,4 TMP	114.23	66	0.00382	
toluene	92.14	66	0.00389	
ethylbenzene	106.17	66	0.00031	
xylenes	106.17	66	0.00095	
cumene	120.19	66	0.00004	
naphthalene	128.17	66	1.34E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.222451	6.773	0.03284	
benzene	0.021717	6.773	0.00321	
2,2,4 TMP	0.014957	6.773	0.00221	
toluene	0.018872	6.773	0.00279	
ethylbenzene	0.001316	6.773	0.00019	
xylenes	0.004000	6.773	0.00059	
cumene	1.30E-04	6.773	0.00002	
naphthalene	4.67E-06	6.773	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
cumene	6.929	1455.8	207.2	0.03
naphthalene	7.146	1831.6	211.82	0.00

MONTH November

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.585	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.03939	
benzene	78.11	66	0.00342	
2,2,4 TMP	114.23	66	0.00341	
toluene	92.14	66	0.00339	
ethylbenzene	106.17	66	0.00026	
xylenes	106.17	66	0.00079	
cumene	120.19	66	0.00003	
naphthalene	128.17	66	9.99E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.168476	5.585	0.03017	
benzene	0.016147	5.585	0.00289	
2,2,4 TMP	0.010992	5.585	0.00197	
toluene	0.013544	5.585	0.00243	
ethylbenzene	0.000906	5.585	0.00016	
xylenes	0.002746	5.585	0.00049	
cumene	8.72E-05	5.585	0.00002	
naphthalene	2.87E-06	5.585	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.11
benzene	6.906	1211	220.79	0.66
2,2,4 TMP	6.812	1257.8	220.74	0.33
toluene	7.017	1377.6	222.64	0.17
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
cumene	6.929	1455.8	207.2	0.02
naphthalene	7.146	1831.6	211.82	0.00

MONTH December

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.476	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.03562	
benzene	78.11	66	0.00303	
2,2,4 TMP	114.23	66	0.00297	
toluene	92.14	66	0.00288	
ethylbenzene	106.17	66	0.00021	
xylenes	106.17	66	0.00064	
cumene	120.19	66	0.00002	
naphthalene	128.17	66	7.09E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.122122	4.476	0.02728	
benzene	0.011453	4.476	0.00256	
2,2,4 TMP	0.007693	4.476	0.00172	
toluene	0.009223	4.476	0.00206	
ethylbenzene	0.000587	4.476	0.00013	
xylenes	0.001774	4.476	0.00040	
cumene	5.46E-05	4.476	0.00001	
naphthalene	1.64E-06	4.476	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}=(0.019337)1			#N/A	
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	0.81
benzene	6.906	1211	220.79	0.47
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Component RVP 14.33

Nearest US Location Albany, NY

MONTH January

		Symbol		Units
Product Type			Component (Average RV	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant A		A	11.61	
Vapor Pressure Equation Constant B		B	4971.67	°R
Daily total solar insolation on a horizontal surface		**I**	532.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		$\mathbf{T_{AA}}$	**483.25**	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient		T_{AN}	475.80	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		$\mathbf{P_{vA}}$	3.751	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concentrations Eq. 40-6	$\mathbf{Z_{Vi} = y_iM_i / M_V}$			
	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	
hexane	86.18	61	0.03713	
benzene	78.11	61	0.00312	
2,2,4 TMP	114.23	61	0.00304	
toluene	92.14	61	0.00290	
ethylbenzene	106.17	61	0.00021	
xylenes	106.17	61	0.00062	
cumene	120.19	61	0.00002	
naphthalene	128.17	61	6.49E-07	
Vapor Mole Fraction Eq. 40-5 $\mathbf{y_i = P_i / P_{VA}}$				
	$\mathbf{P_i = P_{VAI}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	
hexane	0.098594	3.751	0.0262849	
benzene	0.009140	3.751	0.00244	
2,2,4 TMP	0.006095	3.751	0.00162	
toluene	0.007202	3.751	0.00192	
ethylbenzene	0.000446	3.751	0.00012	
xylenes	0.001347	3.751	0.00036	
cumene	4.07E-05	3.751	0.00001	
naphthalene	1.16E-06	3.751	0.00000	
Liquid Mole Fraction Eq. 40-4 $\mathbf{x_i = (Z_{Li}M_L)/M_i}$				
	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure $\mathbf{P_{VAi}=(0.019337)10\wedge(A-(B/(TLA+C)))}$				
	A	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	6.878	1171.5	224.37	0.68
benzene	6.906	1211	220.79	0.39
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

MONTH February

		Symbol		Units
Product Type			Component (Average RVP 14.3	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	789.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		$\mathbf{T_{AA}}$	**485.80**	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		$\mathbf{P_{vA}}$	3.959	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	$\mathbf{Z_{Vi} = y_iM_i / M_V}$			
	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	
hexane	86.18	61	0.03806	
benzene	78.11	61	0.00322	
2,2,4 TMP	114.23	61	0.00315	
toluene	92.14	61	0.00302	
ethylbenzene	106.17	61	0.00022	
xylenes	106.17	61	0.00066	
cumene	120.19	61	0.00002	
naphthalene	128.17	61	7.07E-07	
Vapor Mole Fraction Eq. 40-5 $\mathbf{y_i = P_i / P_{VA}}$				
	$\mathbf{P_i = P_{VAI}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	
hexane	0.106663	3.959	0.02694	
benzene	0.009941	3.959	0.00251	
2,2,4 TMP	0.006651	3.959	0.00168	
toluene	0.007911	3.959	0.00200	
ethylbenzene	0.000496	3.959	0.00013	
xylenes	0.001499	3.959	0.00038	
cumene	4.57E-05	3.959	0.00001	
naphthalene	1.33E-06	3.959	0.00000	
Liquid Mole Fraction Eq. 40-4 $\mathbf{x_i = (Z_{Li}M_L)/M_i}$				
	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure $\mathbf{P_{VAi}=(0.019337)10\wedge(A-(B/(TLA+C)))}$				
	A	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	6.878	1171.5	224.37	0.73
benzene	6.906	1211	220.79	0.42
2,2,4 TMP	6.812	1257.8	220.74	0.21
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

MONTH March

		Symbol		Units
Product Type			Component (Average RVP 14.33	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	1096.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		$\mathbf{T_{AA}}$	**494.80**	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		$\mathbf{P_{vA}}$	4.769	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	$\mathbf{Z_{Vi} = y_iM_i / M_V}$			
	$\mathbf{M_i}$	$\mathbf{M_V}$	$\mathbf{Z_{Vi}}$	
hexane	86.18	61	0.04138	
benzene	78.11	61	0.00356	
2,2,4 TMP	114.23	61	0.00352	
toluene	92.14	61	0.00346	
ethylbenzene	106.17	61	0.00026	
xylenes	106.17	61	0.00079	
cumene	120.19	61	0.00003	
naphthalene	128.17	61	9.42E-07	
Vapor Mole Fraction Eq. 40-5 $\mathbf{y_i = P_i / P_{VA}}$				
	$\mathbf{P_i = P_{VAI}(x_i)}$	$\mathbf{P_{VA}}$	$\mathbf{y_i}$	
hexane	0.139694	4.769	0.02929	
benzene	0.013259	4.769	0.00278	
2,2,4 TMP	0.008972	4.769	0.00188	
toluene	0.010919	4.769	0.00229	
ethylbenzene	0.000714	4.769	0.00015	
xylenes	0.002162	4.769	0.00045	
cumene	6.77E-05	4.769	0.00001	
naphthalene	2.14E-06	4.769	0.00000	
Liquid Mole Fraction Eq. 40-4 $\mathbf{x_i = (Z_{Li}M_L)/M_i}$				
	$\mathbf{Z_{Li}}$	$\mathbf{M_L}$	$\mathbf{M_i}$	$\mathbf{X_i}$
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure $\mathbf{P_{VAi}=(0.019337)10\wedge(A-(B/(TLA+C)))}$				
	A	**B**	**C**	$\mathbf{P_{VAi}}$
hexane	6.878	1171.5	224.37	0.96
benzene	6.906	1211	220.79	0.56
2,2,4 TMP	6.812	1257.8	220.74	0.28
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
cumene	6.929	1455.8	207.2	0.02
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Component RVP 14.33

MONTH **April**

		Symbol		Units
Product Type			Component (Average RVP	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	6.127	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	61	0.04615	
benzene	78.11	61	0.00407	
2,2,4 TMP	114.23	61	0.00409	
toluene	92.14	61	0.00414	
ethylbenzene	106.17	61	0.00033	
xylenes	106.17	61	0.00100	
cumene	120.19	61	0.00004	
naphthalene	128.17	61	1.38E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.200152	6.127	0.03267	
benzene	0.019459	6.127	0.00318	
2,2,4 TMP	0.013366	6.127	0.00218	
toluene	0.016774	6.127	0.00274	
ethylbenzene	0.001159	6.127	0.00019	
xylenes	0.003520	6.127	0.00057	
cumene	1.14E-04	6.127	0.00002	
naphthalene	4.01E-06	6.127	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.38
benzene	6.906	1211	220.79	0.83
2,2,4 TMP	6.812	1257.8	220.74	0.41
toluene	7.017	1377.6	222.64	0.22
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
cumene	6.929	1455.8	207.2	0.03
naphthalene	7.146	1831.6	211.82	0.00

MONTH **May**

		Symbol		Units
Product Type			Component (Average RVP 1	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	7.466	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	61	0.05017	
benzene	78.11	61	0.00450	
2,2,4 TMP	114.23	61	0.00458	
toluene	92.14	61	0.00475	
ethylbenzene	106.17	61	0.00039	
xylenes	106.17	61	0.00120	
cumene	120.19	61	0.00005	
naphthalene	128.17	61	1.84E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.265125	7.466	0.03551	
benzene	0.026257	7.466	0.00352	
2,2,4 TMP	0.018248	7.466	0.00244	
toluene	0.023460	7.466	0.00314	
ethylbenzene	0.001690	7.466	0.00023	
xylenes	0.005148	7.466	0.00069	
cumene	1.71E-04	7.466	0.00002	
naphthalene	6.55E-06	7.466	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.83
benzene	6.906	1211	220.79	1.11
2,2,4 TMP	6.812	1257.8	220.74	0.57
toluene	7.017	1377.6	222.64	0.31
ethylbenzene	6.95	1419.3	212.61	0.10
xylenes	7.009	1462.3	215.11	0.08
cumene	6.929	1455.8	207.2	0.04
naphthalene	7.146	1831.6	211.82	0.00

MONTH **June**

		Symbol		Units
Product Type			Component (Average RVP 14.	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	8.883	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	61	0.05388	
benzene	78.11	61	0.00491	
2,2,4 TMP	114.23	61	0.00505	
toluene	92.14	61	0.00534	
ethylbenzene	106.17	61	0.00046	
xylenes	106.17	61	0.00140	
cumene	120.19	61	0.00005	
naphthalene	128.17	61	2.37E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.338806	8.883	0.03814	
benzene	0.034093	8.883	0.00384	
2,2,4 TMP	0.023938	8.883	0.00269	
toluene	0.031433	8.883	0.00354	
ethylbenzene	0.002346	8.883	0.00026	
xylenes	0.007168	8.883	0.00081	
cumene	2.44E-04	8.883	0.00003	
naphthalene	1.00E-05	8.883	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	2.33
benzene	6.906	1211	220.79	1.45
2,2,4 TMP	6.812	1257.8	220.74	0.74
toluene	7.017	1377.6	222.64	0.42
ethylbenzene	6.95	1419.3	212.61	0.14
xylenes	7.009	1462.3	215.11	0.12
cumene	6.929	1455.8	207.2	0.06
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Component RVP 14.33

MONTH July

		Symbol		Units
Product Type			Component (Average RVP 1	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		I	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	9.519	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	61	0.05541	
benzene	78.11	61	0.00509	
2,2,4 TMP	114.23	61	0.00524	
toluene	92.14	61	0.00560	
ethylbenzene	106.17	61	0.00049	
xylenes	106.17	61	0.00149	
cumene	120.19	61	0.00006	
naphthalene	128.17	61	2.62E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.373357	9.519	0.03922	
benzene	0.037806	9.519	0.00397	
2,2,4 TMP	0.026652	9.519	0.00280	
toluene	0.035292	9.519	0.00371	
ethylbenzene	0.002671	9.519	0.00028	
xylenes	0.008171	9.519	0.00086	
cumene	2.80E-04	9.519	0.00003	
naphthalene	1.19E-05	9.519	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.57
benzene	6.906	1211	220.79	1.60
2,2,4 TMP	6.812	1257.8	220.74	0.83
toluene	7.017	1377.6	222.64	0.47
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
cumene	6.929	1455.8	207.2	0.07
naphthalene	7.146	1831.6	211.82	0.00

MONTH August

		Symbol		Units
Product Type			Component (Average RVP 1	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		I	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	9.320	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	61	0.05494	
benzene	78.11	61	0.00503	
2,2,4 TMP	114.23	61	0.00518	
toluene	92.14	61	0.00552	
ethylbenzene	106.17	61	0.00048	
xylenes	106.17	61	0.00147	
cumene	120.19	61	0.00006	
naphthalene	128.17	61	2.54E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.362432	9.320	0.03889	
benzene	0.036630	9.320	0.00393	
2,2,4 TMP	0.025791	9.320	0.00277	
toluene	0.034064	9.320	0.00366	
ethylbenzene	0.002567	9.320	0.00028	
xylenes	0.007850	9.320	0.00084	
cumene	2.69E-04	9.320	0.00003	
naphthalene	1.13E-05	9.320	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.55
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.45
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
cumene	6.929	1455.8	207.2	0.07
naphthalene	7.146	1831.6	211.82	0.00

MONTH September

		Symbol		Units
Product Type			Component (Average RV	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		I	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	8.058	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	61	0.05178	
benzene	78.11	61	0.00468	
2,2,4 TMP	114.23	61	0.00478	
toluene	92.14	61	0.00500	
ethylbenzene	106.17	61	0.00042	
xylenes	106.17	61	0.00129	
cumene	120.19	61	0.00005	
naphthalene	128.17	61	2.06E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.295329	8.058	0.03665	
benzene	0.029455	8.058	0.00366	
2,2,4 TMP	0.020563	8.058	0.00255	
toluene	0.026683	8.058	0.00331	
ethylbenzene	0.001952	8.058	0.00024	
xylenes	0.005956	8.058	0.00074	
cumene	2.00E-04	8.058	0.00002	
naphthalene	7.90E-06	8.058	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.03
benzene	6.906	1211	220.79	1.25
2,2,4 TMP	6.812	1257.8	220.74	0.64
toluene	7.017	1377.6	222.64	0.36
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.10
cumene	6.929	1455.8	207.2	0.05
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Component RVP 14.33

MONTH October

		Symbol		Units
Product Type			Component (Average RVP 14	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.404	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	**$Z_{Vi} = y_i M_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	61	0.04703	
benzene	78.11	61	0.00416	
2,2,4 TMP	114.23	61	0.00419	
toluene	92.14	61	0.00427	
ethylbenzene	106.17	61	0.00034	
xylenes	106.17	61	0.00104	
cumene	120.19	61	0.00004	
naphthalene	128.17	61	1.47E-06	
Vapor Mole Fraction Eq. 40-5	**$y_i = P_i / P_{VA}$**			
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.213182	6.404	0.03329	
benzene	0.020812	6.404	0.00325	
2,2,4 TMP	0.014333	6.404	0.00224	
toluene	0.018085	6.404	0.00282	
ethylbenzene	0.001261	6.404	0.00020	
xylenes	0.003834	6.404	0.00060	
cumene	1.25E-04	6.404	0.00002	
naphthalene	4.48E-06	6.404	0.00000	
Liquid Mole Fraction Eq. 40-4	**$x_i = (Z_{Li} M_L)/M_i$**			
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure	**P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))**			
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
cumene	6.929	1455.8	207.2	0.03
naphthalene	7.146	1831.6	211.82	0.00

MONTH November

		Symbol		Units
Product Type			Component (Average RVP 1	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.273	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	**$Z_{Vi} = y_i M_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	61	0.04326	
benzene	78.11	61	0.00376	
2,2,4 TMP	114.23	61	0.00374	
toluene	92.14	61	0.00372	
ethylbenzene	106.17	61	0.00029	
xylenes	106.17	61	0.00087	
cumene	120.19	61	0.00003	
naphthalene	128.17	61	1.10E-06	
Vapor Mole Fraction Eq. 40-5	**$y_i = P_i / P_{VA}$**			
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.161457	5.273	0.03062	
benzene	0.015474	5.273	0.00293	
2,2,4 TMP	0.010534	5.273	0.00200	
toluene	0.012979	5.273	0.00246	
ethylbenzene	0.000868	5.273	0.00016	
xylenes	0.002631	5.273	0.00050	
cumene	8.36E-05	5.273	0.00002	
naphthalene	2.75E-06	5.273	0.00000	
Liquid Mole Fraction Eq. 40-4	**$x_i = (Z_{Li} M_L)/M_i$**			
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure	**P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))**			
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.11
benzene	6.906	1211	220.79	0.66
2,2,4 TMP	6.812	1257.8	220.74	0.33
toluene	7.017	1377.6	222.64	0.17
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
cumene	6.929	1455.8	207.2	0.02
naphthalene	7.146	1831.6	211.82	0.00

MONTH December

		Symbol		Units
Product Type			Component (Average RVP 14.33)	
Vapor Molecular weight		M_v	**61.00**	
Vapor Pressure Equation Constant		A	11.61	
Vapor Pressure Equation Constant		B	4971.67	°R
Daily total solar insolation on a horiz		**I**	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.220	psia
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concen	**$Z_{Vi} = y_i M_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	61	0.03918	
benzene	78.11	61	0.00333	
2,2,4 TMP	114.23	61	0.00327	
toluene	92.14	61	0.00316	
ethylbenzene	106.17	61	0.00023	
xylenes	106.17	61	0.00070	
cumene	120.19	61	0.00002	
naphthalene	128.17	61	7.80E-07	
Vapor Mole Fraction Eq. 40-5	**$y_i = P_i / P_{VA}$**			
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.117033	4.220	0.02773	
benzene	0.010976	4.220	0.00260	
2,2,4 TMP	0.007373	4.220	0.00175	
toluene	0.008838	4.220	0.00209	
ethylbenzene	0.000562	4.220	0.00013	
xylenes	0.001700	4.220	0.00040	
cumene	5.23E-05	4.220	0.00001	
naphthalene	1.57E-06	4.220	0.00000	
Liquid Mole Fraction Eq. 40-4	**$x_i = (Z_{Li} M_L)/M_i$**			
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.136	92	86.18	0.14518
benzene	0.02	92	78.11	0.02356
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.075	92	92.14	0.07489
ethylbenzene	0.02	92	106.17	0.01733
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure	**P_{VAi}=(0.019337)1**		#N/A	
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	0.81
benzene	6.906	1211	220.79	0.47
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Gasoline

Nearest US Location Albany, NY

MONTH **January**

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant A		A	11.60	
Vapor Pressure Equation Constant B		B	4937.93	°R
Daily total solar insolation on a horizontal surface		**I**	532.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**483.25**	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient		T_{AN}	475.80	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	3.982	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00248	
benzene	78.11	66	0.00255	
2,2,4 TMP	114.23	66	0.00276	
toluene	92.14	66	0.00246	
ethylbenzene	106.17	66	0.00013	
xylenes	106.17	66	0.00057	
cumene	120.19	66	0.00002	
naphthalene	128.17	66	5.90E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.007565	3.982	0.0018999	
benzene	0.008583	3.982	0.00216	
2,2,4 TMP	0.006360	3.982	0.00160	
toluene	0.007014	3.982	0.00176	
ethylbenzene	0.000326	3.982	0.00008	
xylenes	0.001405	3.982	0.00035	
cumene	4.25E-05	3.982	0.00001	
naphthalene	1.21E-06	3.982	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	96	86.18	0.01114
benzene	0.018	96	78.11	0.02212
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.07	96	92.14	0.07293
ethylbenzene	0.014	96	106.17	0.01266
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure $P_{VAi}=(0.019337)10^\wedge(A-(B/(TLA+C)))$				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.68
benzene	6.906	1211	220.79	0.39
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

MONTH **February**

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	789.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**485.80**	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.201	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00254	
benzene	78.11	66	0.00263	
2,2,4 TMP	114.23	66	0.00286	
toluene	92.14	66	0.00256	
ethylbenzene	106.17	66	0.00014	
xylenes	106.17	66	0.00060	
cumene	120.19	66	0.00002	
naphthalene	128.17	66	6.42E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.008184	4.201	0.00195	
benzene	0.009336	4.201	0.00222	
2,2,4 TMP	0.006940	4.201	0.00165	
toluene	0.007705	4.201	0.00183	
ethylbenzene	0.000362	4.201	0.00009	
xylenes	0.001564	4.201	0.00037	
cumene	4.77E-05	4.201	0.00001	
naphthalene	1.39E-06	4.201	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	96	86.18	0.01114
benzene	0.018	96	78.11	0.02212
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.07	96	92.14	0.07293
ethylbenzene	0.014	96	106.17	0.01266
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure $P_{VAi}=(0.019337)10^\wedge(A-(B/(TLA+C)))$				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.73
benzene	6.906	1211	220.79	0.42
2,2,4 TMP	6.812	1257.8	220.74	0.21
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

MONTH **March**

		Symbol		Units
Product Type			Gasoline - RVP 13.5	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.63	
Vapor Pressure Equation Constant		B	5015.72	°R
Daily total solar insolation on a horiz		**I**	1096.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**494.80**	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.461	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00301	
benzene	78.11	66	0.00317	
2,2,4 TMP	114.23	66	0.00348	
toluene	92.14	66	0.00319	
ethylbenzene	106.17	66	0.00018	
xylenes	106.17	66	0.00078	
cumene	120.19	66	0.00003	
naphthalene	128.17	66	9.31E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.010272	4.461	0.00230	
benzene	0.011933	4.461	0.00268	
2,2,4 TMP	0.008972	4.461	0.00201	
toluene	0.010191	4.461	0.00228	
ethylbenzene	0.000500	4.461	0.00011	
xylenes	0.002162	4.461	0.00048	
cumene	6.77E-05	4.461	0.00002	
naphthalene	2.14E-06	4.461	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure $P_{VAi}=(0.019337)10^\wedge(A-(B/(TLA+C)))$				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.96
benzene	6.906	1211	220.79	0.56
2,2,4 TMP	6.812	1257.8	220.74	0.28
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
cumene	6.929	1455.8	207.2	0.02
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Gasoline

MONTH **April**

		Symbol		Units
Product Type			Gasoline - RVP 13	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.64	
Vapor Pressure Equation Constant		B	5043.58	°R
Daily total solar insolation on a horiz		I	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	5.499	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.00349	
benzene	78.11	66	0.00377	
2,2,4 TMP	114.23	66	0.00421	
toluene	92.14	66	0.00397	
ethylbenzene	106.17	66	0.00024	
xylenes	106.17	66	0.00103	
cumene	120.19	66	0.00004	
naphthalene	128.17	66	1.42E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.014717	5.499	0.00268	
benzene	0.017513	5.499	0.00318	
2,2,4 TMP	0.013366	5.499	0.00243	
toluene	0.015656	5.499	0.00285	
ethylbenzene	0.000811	5.499	0.00015	
xylenes	0.003520	5.499	0.00064	
cumene	1.14E-04	5.499	0.00002	
naphthalene	4.01E-06	5.499	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.38
benzene	6.906	1211	220.79	0.83
2,2,4 TMP	6.812	1257.8	220.74	0.41
toluene	7.017	1377.6	222.64	0.22
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
cumene	6.929	1455.8	207.2	0.03
naphthalene	7.146	1831.6	211.82	0.00

MONTH **May**

		Symbol		Units
Product Type			Gasoline - RVP 9	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.76	
Vapor Pressure Equation Constant		B	5315.06	°R
Daily total solar insolation on a horiz		I	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	4.453	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.00572	
benzene	78.11	66	0.00628	
2,2,4 TMP	114.23	66	0.00709	
toluene	92.14	66	0.00687	
ethylbenzene	106.17	66	0.00043	
xylenes	106.17	66	0.00186	
cumene	120.19	66	0.00007	
naphthalene	128.17	66	2.86E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.019494	4.453	0.00438	
benzene	0.023631	4.453	0.00531	
2,2,4 TMP	0.018248	4.453	0.00410	
toluene	0.021896	4.453	0.00492	
ethylbenzene	0.001183	4.453	0.00027	
xylenes	0.005148	4.453	0.00116	
cumene	1.71E-04	4.453	0.00004	
naphthalene	6.55E-06	4.453	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	1.83
benzene	6.906	1211	220.79	1.11
2,2,4 TMP	6.812	1257.8	220.74	0.57
toluene	7.017	1377.6	222.64	0.31
ethylbenzene	6.95	1419.3	212.61	0.10
xylenes	7.009	1462.3	215.11	0.08
cumene	6.929	1455.8	207.2	0.04
naphthalene	7.146	1831.6	211.82	0.00

MONTH **June**

		Symbol		Units
Product Type			Gasoline - RVP 9	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.76	
Vapor Pressure Equation Constant		B	5315.06	°R
Daily total solar insolation on a horiz		I	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		**T_{AA}**	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		**P_{vA}**	5.362	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	66	0.00607	
benzene	78.11	66	0.00677	
2,2,4 TMP	114.23	66	0.00773	
toluene	92.14	66	0.00764	
ethylbenzene	106.17	66	0.00049	
xylenes	106.17	66	0.00215	
cumene	120.19	66	0.00008	
naphthalene	128.17	66	3.63E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.024912	5.362	0.00465	
benzene	0.030684	5.362	0.00572	
2,2,4 TMP	0.023938	5.362	0.00446	
toluene	0.029337	5.362	0.00547	
ethylbenzene	0.001642	5.362	0.00031	
xylenes	0.007168	5.362	0.00134	
cumene	2.44E-04	5.362	0.00005	
naphthalene	1.00E-05	5.362	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	**M_L**	**M_i**	**X_i**
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	**B**	**C**	**P_{VAi}**
hexane	6.878	1171.5	224.37	2.33
benzene	6.906	1211	220.79	1.45
2,2,4 TMP	6.812	1257.8	220.74	0.74
toluene	7.017	1377.6	222.64	0.42
ethylbenzene	6.95	1419.3	212.61	0.14
xylenes	7.009	1462.3	215.11	0.12
cumene	6.929	1455.8	207.2	0.06
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Gasoline

MONTH July

		Symbol		Units
Product Type			Gasoline - RVP 9	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.76	
Vapor Pressure Equation Constant		B	5315.06	°R
Daily total solar insolation on a horiz		I	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.774	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00621	
benzene	78.11	66	0.00697	
2,2,4 TMP	114.23	66	0.00799	
toluene	92.14	66	0.00796	
ethylbenzene	106.17	66	0.00052	
xylenes	106.17	66	0.00228	
cumene	120.19	66	0.00009	
naphthalene	128.17	66	3.99E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.027453	5.774	0.00475	
benzene	0.034026	5.774	0.00589	
2,2,4 TMP	0.026652	5.774	0.00462	
toluene	0.032940	5.774	0.00571	
ethylbenzene	0.001870	5.774	0.00032	
xylenes	0.008171	5.774	0.00142	
cumene	2.80E-04	5.774	0.00005	
naphthalene	1.19E-05	5.774	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.57
benzene	6.906	1211	220.79	1.60
2,2,4 TMP	6.812	1257.8	220.74	0.83
toluene	7.017	1377.6	222.64	0.47
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
cumene	6.929	1455.8	207.2	0.07
naphthalene	7.146	1831.6	211.82	0.00

MONTH August

		Symbol		Units
Product Type			Gasoline - RVP 9	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.76	
Vapor Pressure Equation Constant		B	5315.06	°R
Daily total solar insolation on a horiz		I	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.644	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00617	
benzene	78.11	66	0.00691	
2,2,4 TMP	114.23	66	0.00791	
toluene	92.14	66	0.00786	
ethylbenzene	106.17	66	0.00051	
xylenes	106.17	66	0.00224	
cumene	120.19	66	0.00009	
naphthalene	128.17	66	3.88E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.026649	5.644	0.00472	
benzene	0.032967	5.644	0.00584	
2,2,4 TMP	0.025791	5.644	0.00457	
toluene	0.031793	5.644	0.00563	
ethylbenzene	0.001797	5.644	0.00032	
xylenes	0.007850	5.644	0.00139	
cumene	2.69E-04	5.644	0.00005	
naphthalene	1.13E-05	5.644	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.55
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.45
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
cumene	6.929	1455.8	207.2	0.07
naphthalene	7.146	1831.6	211.82	0.00

MONTH September

		Symbol		Units
Product Type			Gasoline - RVP 13	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.64	
Vapor Pressure Equation Constant		B	5043.58	°R
Daily total solar insolation on a horiz		I	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	7.261	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00390	
benzene	78.11	66	0.00432	
2,2,4 TMP	114.23	66	0.00490	
toluene	92.14	66	0.00479	
ethylbenzene	106.17	66	0.00030	
xylenes	106.17	66	0.00132	
cumene	120.19	66	0.00005	
naphthalene	128.17	66	2.11E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.021715	7.261	0.00299	
benzene	0.026509	7.261	0.00365	
2,2,4 TMP	0.020563	7.261	0.00283	
toluene	0.024904	7.261	0.00343	
ethylbenzene	0.001367	7.261	0.00019	
xylenes	0.005956	7.261	0.00082	
cumene	2.00E-04	7.261	0.00003	
naphthalene	7.90E-06	7.261	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.03
benzene	6.906	1211	220.79	1.25
2,2,4 TMP	6.812	1257.8	220.74	0.64
toluene	7.017	1377.6	222.64	0.36
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.10
cumene	6.929	1455.8	207.2	0.05
naphthalene	7.146	1831.6	211.82	0.00

Landing and Cleaning Speciation - Gasoline

MONTH October

		Symbol		Units
Product Type			Gasoline - RVP 13.5	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.63	
Vapor Pressure Equation Constant		B	5015.72	°R
Daily total solar insolation on a horiz		**I**	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.005	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00341	
benzene	78.11	66	0.00369	
2,2,4 TMP	114.23	66	0.00413	
toluene	92.14	66	0.00392	
ethylbenzene	106.17	66	0.00024	
xylenes	106.17	66	0.00103	
cumene	120.19	66	0.00004	
naphthalene	128.17	66	1.45E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.015675	6.005	0.00261	
benzene	0.018731	6.005	0.00312	
2,2,4 TMP	0.014333	6.005	0.00239	
toluene	0.016880	6.005	0.00281	
ethylbenzene	0.000883	6.005	0.00015	
xylenes	0.003834	6.005	0.00064	
cumene	1.25E-04	6.005	0.00002	
naphthalene	4.48E-06	6.005	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	92	86.18	0.01068
benzene	0.018	92	78.11	0.02120
2,2,4 TMP	0.04	92	114.23	0.03222
toluene	0.07	92	92.14	0.06989
ethylbenzene	0.014	92	106.17	0.01213
xylenes	0.07	92	106.17	0.06066
cumene	0.005	92	120.19	0.00383
naphthalene	0.00415	92	128.17	0.00298
Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
cumene	6.929	1455.8	207.2	0.03
naphthalene	7.146	1831.6	211.82	0.00

MONTH November

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.585	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00290	
benzene	78.11	66	0.00308	
2,2,4 TMP	114.23	66	0.00341	
toluene	92.14	66	0.00316	
ethylbenzene	106.17	66	0.00018	
xylenes	106.17	66	0.00079	
cumene	120.19	66	0.00003	
naphthalene	128.17	66	9.99E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.012388	5.585	0.00222	
benzene	0.014532	5.585	0.00260	
2,2,4 TMP	0.010992	5.585	0.00197	
toluene	0.012641	5.585	0.00226	
ethylbenzene	0.000634	5.585	0.00011	
xylenes	0.002746	5.585	0.00049	
cumene	8.72E-05	5.585	0.00002	
naphthalene	2.87E-06	5.585	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	96	86.18	0.01114
benzene	0.018	96	78.11	0.02212
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.07	96	92.14	0.07293
ethylbenzene	0.014	96	106.17	0.01266
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.11
benzene	6.906	1211	220.79	0.66
2,2,4 TMP	6.812	1257.8	220.74	0.33
toluene	7.017	1377.6	222.64	0.17
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
cumene	6.929	1455.8	207.2	0.02
naphthalene	7.146	1831.6	211.82	0.00

MONTH December

		Symbol		Units
Product Type			Gasoline - RVP 15	
Vapor Molecular weight		M_v	**66.00**	
Vapor Pressure Equation Constant		A	11.60	
Vapor Pressure Equation Constant		B	4937.93	°R
Daily total solar insolation on a horiz		**I**	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.476	psia
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concen $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	66	0.00262	
benzene	78.11	66	0.00273	
2,2,4 TMP	114.23	66	0.00297	
toluene	92.14	66	0.00268	
ethylbenzene	106.17	66	0.00015	
xylenes	106.17	66	0.00064	
cumene	120.19	66	0.00002	
naphthalene	128.17	66	7.09E-07	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.008980	4.476	0.00201	
benzene	0.010308	4.476	0.00230	
2,2,4 TMP	0.007693	4.476	0.00172	
toluene	0.008608	4.476	0.00192	
ethylbenzene	0.000411	4.476	0.00009	
xylenes	0.001774	4.476	0.00040	
cumene	5.46E-05	4.476	0.00001	
naphthalene	1.64E-06	4.476	0.00000	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.01	96	86.18	0.01114
benzene	0.018	96	78.11	0.02212
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.07	96	92.14	0.07293
ethylbenzene	0.014	96	106.17	0.01266
xylenes	0.07	96	106.17	0.06329
cumene	0.005	96	120.19	0.00399
naphthalene	0.00415	96	128.17	0.00311
Component Vapor pressure P_{VAi}**=(0.019337)1**			#N/A	
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.81
benzene	6.906	1211	220.79	0.47
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
cumene	6.929	1455.8	207.2	0.01
naphthalene	7.146	1831.6	211.82	0.00

July Total VOC Landing and Cleaning Calculations for IFRs

Used for H2S Modeling

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**5,191.59**	lb/event
		2.596	ton/event
Product in tank during landing:		**Crude RVP 12.5**	
Month the landing occurred:		**July**	
Number of days the tank stays idle	n_d	3	days
Height of floating roof deck, h_d (ft) (assume 3 ft if unknown)	h_d	3.00	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d$*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s	**L_{SL}**	**3403.22**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.8759	
True vapor pressure of stock liquid (avg. ambient temp. of month landing oc	P_{VA}	12.086	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	50	lb/lb-mol
Saturation factor	K_S	0.36	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,788.37**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing oc	P_{VA}	12.086	psia
Volume of the vapor space	V_V	33747.58	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	50	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**12.086**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	10.377	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,189.7	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.8759**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0518	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	12.0864	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.052**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	13.14	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	11.09	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	10.377	
Vapor Pressure Equation Constant B	B	4,190	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**33,747.58**	ft^3
Height of vapor space under landed deck ($h_v=h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.36**	
Vapor Pressure at TAA for month	P_{VA}	12.086	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**17,058.99**	**lb/event**
		8.5295	**ton/event**

Product in tank prior to cleaning		Crude RVP 12.5	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	**L_P**	3739.324	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	12.086	
Volume of vapor space	V_V	70,563.12	
Stock vapor molecular weight	M_V	50	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	**L_{CV}**	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*Wl		163632.813	
Cvmax = P_{VA}/Pa		0.83067895	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**12.086**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	10.377	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,189.7	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	**V_V**	**70,563.12**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d$-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	**L_{SL}**	**4195.95**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.8759	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	12.086	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	50	lb/lb-mol
Standing idle saturation factor	K_S	0.21	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V$/RT_V)M_V(C_{st}	**L_{FL}**	**1,121.80**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	12.086	psia
Volume of the vapor space	V_V	70563.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	50	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/T	**KE**	**0.8759**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0518	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	12.0864	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensio	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.052**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	13.14	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	11.09	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	10.377	
Vapor Pressure Equation Constant B	B	4,190	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3
L_P	1872.919	1875.248
S *	**0.25**	**0.25**
H_l	0.240	0.23
V_V	**70,686.03**	**70,773.96**
h_v	5.76	5.77
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1day

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD²/4))+(0.0		**6.31**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	125	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)³))/(sD/2)²)		1578	ft3
Vertical distance from bottom shell to the liquid surface in cone bot	h_p	0.4	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.4	ft
Height of liquid in bottom of cone		0	ft

LANDING PTE CALCULATIONS

	Symbol		Units
Total Landing Losses (Eq.3-1 $L_{TL} = L_{SL}+L_{FL}$)	**L_{TL}**	**4,020.37**	lb/event
		2.010	ton/event
Product in tank during landing:		**Crude RVP 12.5**	
Month the landing occurred:		**July**	
Number of days the tank stays idle	n_d	**3**	days
Height of floating roof deck, *h d* (ft) (assume 3 ft if unknown)	h_d	**3.00**	ft
Height of the stock liquid	h_l	0.250	ft
Full heel, Partial heel or Drain Dry?		Partial Heel	
Flat or Cone Bottom Tank?		Flat	
Standing Idle Losses Eq. 3-7 $L_{SL} = n_d*KE*((P_{VA}*V_V)/R*Tv))*M_V*K_s$	**L_{SL}**	**2635.45**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.8759	
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	12.086	psia
Volume of the vapor space	V_V	26134.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground temperature - a	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	50	lb/lb-mol
Saturation factor	K_S	0.36	
Filling Losses Eq. 3-18 $L_{FL} = (P_{VA}V_V/RT_V)M_V(C_{sf}S)$	**L_{FL}**	**1,384.92**	**lb**
True vapor pressure of stock liquid (avg. ambient temp. of month landing occ	P_{VA}	12.086	psia
Volume of the vapor space	V_V	26134.12	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient temp of the month)	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	50	lb/lb-mole
Filling saturation correction factor for wind (1.0 for IFT and DEFT)	C_{sf}	1	
Filling Saturation Factor (0.60 for full heel, 0.50 for partial heel, 0.15 for drai	S	0.5	
Average Ambient Temperature during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	**P_{VA}**	**12.086**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	10.377	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,189.7	°R
Average ambien temperature during month	TAA	531.4	°R
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-Pv	**KE**	**0.8759**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0518	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	12.0864	psia
Average Daily Liquid Surface Temperature (TLA=TAA)	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for the month	TAX	541.00	°R
Average daily minimum ambient temperature for the month	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.052**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	13.14	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	11.09	psia
Average daily max liquid surface temp TLX = TAA + 0.25ΔTV	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA - 0.25ΔTV	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	10.377	
Vapor Pressure Equation Constant B	B	4,190	
Average Daily Liquid Surface Temperature (TLA=TAA for landings)	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	
Vapor Space Volume $V_V=h_v((PI)D^2/4)$	**V_V**	**26,134.12**	ft^3
Height of vapor space under landed deck ($h_{v=}h_d-h_l$)	h_v	2.75	ft
Deck height	hd	3.00	ft
Liquid height	hl	0.25	ft
Vented Vapor Saturation Factor (Eq. 1-21: Ks = 1/(1+0.053*P_{VA}*Hvo))	**Ks**	**0.36**	
Vapor Pressure at TAA for month	P_{VA}	12.086	psia
Vapor Space Outage (Table 7.1-17 H_{vo} set to h_v)	Hvo	2.75	ft

CLEANING PTE CALCULATIONS

Includes Landing (standing and filling losses) and Additonal Purges associated with this cleaning event

	Symbol		Units
Total Cleaning Losses LFV = LP+LCV+ LF+LS	**LFV**	**22,692.37**	**lb/event**
		11.3462	**ton/event**

	Symbol		Units
Product in tank prior to cleaning		rude RVP 12.5	
Month the cleaning occurred:		July	
Calibration Gas		Propane (C3)	
Duration of the continued forced ventilation	n_{CV}	3	days
Height of deck during cleaning (assume 6 ft if unknown)	h_d	6	ft
Number of days standing idle before cleaning	n_d	3	days
Height of the stock liquid	h_l	0.250	ft
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Hours per day of force ventilation	t_V	10	hrs/day
Average LEL Reading	LEL	10	%
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	L_P	5384.626	
Saturation Factor (0.5 for IFR with a partial liquid heel)	S	**0.5**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average temperature of the vapor space = average ambient tempera	T_V (T_{AA})	531.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	12.086	
Volume of vapor space	V_V	101,610.89	
Stock vapor molecular weight	M_V	50	lb/lb-mol
Continued Forced Ventiliation Emissions			
L_{CV} =60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)	L_{CV}	4,253.76	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	3	days
Daily period of forced ventilation	t_V	10	hrs/day
Average vapor concentration by volume during continued forced ven	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.55	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average amb	T_V (T_{AA})	531.35	
Prior Stock Remains = LCV max			
L_{CV} max = 5.9*D^2*(hl)*WI		235631.25	
Cvmax = P_{VA}/Pa		0.830678947	
Average Ambient Temp during Month TAA = (TAX+TAN) /2	**TAA**	**531.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.1-2	TAX	541	°R
Average daily montlhy minimum ambient temperature, Table 7.1-2	TAN	521.7	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	P_{VA}	**12.086**	**psia**
Vapor Pressure Equation Constant A (Table 7.1-2)	A	10.377	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	4,189.7	°R
Average ambient temperature during month	TAA	531.4	°R
Vapor Space Volume V_V=h_v((PI)D^2/4)	V_V	**101,610.89**	ft^3
Height of vapor space under landed deck (h_v=h_d-h_l)	h_v	5.75	ft
Deck height	hd	6.00	ft
Liquid height	hl	0.25	ft

	Symbol		Units
Standing Idle Losses Eq. 3-7 L_{SL} = n_d*KE*((P_{VA}*	L_{SL}	**6042.17**	**lb**
Number of days the tank stays idle	n_d	3	
Vapor space expansion factor, per day	K_E	0.8759	
True vapor pressure of stock liquid (avg. ambient	P_{VA}	12.086	psia
Volume of the vapor space	V_V	101610.89	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient tem	T_V (T_{AA})	531.35	°R
Stock vapor molecular weight	M_V	50	lb/lb-mol
Standing idle saturation factor	K_S	0.21	
Filling Losses Eq. 3-18 L_{FL} = ($P_{VA}V_V/RT_V$)M_V(C_{sf}	L_{FL}	**1,615.39**	**lb**
True vapor pressure of stock liquid (avg. ambient	P_{VA}	12.086	psia
Volume of the vapor space	V_V	101610.89	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (average ambient ter	T_V (T_{AA})	531.4	°R
Stock vapor molecular weight	M_V	50	lb/lb-mole
Filling saturation correction factor for wind (1.0 for	C_{sf}	1	
Filling Saturation Factor (0.15 for drain dry)	S	0.15	
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/	**KE**	**0.8759**	**per day**
Average Daily Vapor Temperature Range	ΔTv	22.87	°R
Average Daily Vapor Pressure Range	ΔPv	2.0518	psi
Breather Vent Pressure Setting Range (ΔPB = 0)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	12.0864	psia
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**22.87**	**°R**
Average daily ambient temperature range - Equat	ΔTA	19.3	°R
Average tank surface solar absorptance, dimensi	α	0.25	
Daily total solar insolation on a horizontal surface	I	1872	Btu/ft^2-day
Average daily maximum ambient temperature for	TAX	541.00	°R
Average daily minimum ambient temperature for t	TAN	521.70	°R
Average Daily Vapor Pressure Range (ΔPv)			
Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**2.052**	**psia**
Vapor pressure Eq. 1-25; PVX = exp[A-(B/TLX)]	PVX	13.14	psia
Vapor pressure Eq. 1-25; PVN = exp[A-(B/TLN)]	PVN	11.09	psia
Average daily max liquid surface temp TLX = TAA	TLX	537.07	°R
Average daily min liquid surface temp TLN = TAA	TLN	525.63	°R
Vapor Pressure Equation Constant A	A	10.377	
Vapor Pressure Equation Constant B	B	4,190	
Average Daily Liquid Surface Temperature (TLA=	TAA	531.35	
Average Daily Vapor Temperature Range	ΔTv	22.87	

Additional Purge Emissions

	Day 2	Day 3
L_P	2696.693	2699.738
S *	**0.25**	**0.25**
H_l	0.241	0.23
V_V	**101,776.19**	**101,891.10**
h_v	5.76	5.77
h_{d2}	6.00	6.00

*S is based on fixed roof Eq. 4-6 < 1day

Height of Vapor Space Calculation for Cone Bottom

Height of vapor space under landed deck, (h_d + sD/6)- [(volume of heel/(πD²/4))+(0.0		**6.37**	**ft**
Tank cone bottom slope	s	0.02	ft/ft
Diameter	D	150	ft
Deck leg height	h_d	6	ft
Volume of heel, (πD^2/12)*((sD/2-h_p)³))/(sD/2)²)		2727	ft3
Vertical distance from bottom shell to the liquid surface in cone bo	h_p	0.5	ft
Effective height of cone-down bottom, sD/6 (Figure 7.1-23)		0.5	ft
Height of liquid in bottom of cone		0	ft

Attachment 5

Results for Benzene and Non-HTACs

Summary of Model Results[1]

File Name	Annual or Hourly	Overall Comments	Benzene, all source group, ug/m^3	Xylenes, all source group, ug/m^3	Toluene, all source group, ug/m^3	Hexane, all source group, ug/m^3	Ethylbenzene, all source group, ug/m^3	2,2,4-TMP, all source group, ug/m^3
Global Alb Annual All Run 1	Annual	max loading for truck and rail under OS #1	0.24	1.10	0.67	1.73	0.08	0.28
Global Alb Annual All Run 2	Annual	max fugitives at marine, some fugitives at rail	0.24	1.16	0.64	1.75	0.08	0.27
Global Alb Annual All Run 3	Annual	max fugitives at marine, some fugitives at truck	0.25	1.27	0.69	1.76	0.08	0.28
Global Alb Annual All Run 4	Annual	max loading for marine under OS#1, max loading at rail, remaining loading at truck under OS#1	0.24	1.07	0.66	1.73	0.08	0.28
Global Alb Annual All Run 5	Annual	max loading for marine under OS#1, max loading at truck under OS#1, remaining loading at rail	0.24	1.10	0.67	1.74	0.08	0.28
Global Alb Annual All Run 6	Annual	max fugitives at truck, max crude fugitives at marine	0.27	1.60	0.79	1.75	0.09	0.30
Global Alb Annual All Run 7	Annual	max fugitives at rail to subcap with some truck fugitives, max crude fugitives at marine	0.25	1.64	0.76	1.74	0.09	0.25
Global Alb Annual All Run 8	Annual	worst case annual assumptions from previous runs (Run 6) with landings distributed only between blendstock tanks	0.29	1.63	0.89	2.10	0.11	0.33
Global Alb Annual Run 9	Annual	emissions at VCUM1 instead of VCUM2	0.26	0.91	0.59	1.72	0.07	0.26
Global Alb Hourly All Run 0	Hourly	hourly loading with fugitives, no cleanings or landings	28.00	344.8	144.9			
Global Alb Hourly All Run 1	Hourly	hourly loading with fugitives and tank 31 landing	208.5	345.8	242.7			
Global Alb Hourly All Run 2	Hourly	hourly loading with fugitives and tank 32 landing	220.1	345.8	252.2			
Global Alb Hourly All Run 3	Hourly	hourly loading with fugitives and tank 39 landing	150.5	345.8	173.0			
Global Alb Hourly All Run 4	Hourly	hourly loading with fugitives and tank 114 landing	173.7	347.8	193.9			
Global Alb Hourly All Run 5	Hourly	hourly loading with fugitives and tank 115 landing	183.1	345.8	203.2			
Global Alb Hourly All Run 6	Hourly	hourly loading with fugitives and tank 117 landing	219.8	345.8	243.6			
Global Alb Hourly All Run 7	Hourly	hourly loading with fugitives and tank 118 landing	125.3	345.8	148.7			
Global Alb Hourly All Run 8	Hourly	hourly loading with fugitives and tank 119 landing	125.0	346.0	155.9			
Global Alb Hourly All Run 9	Hourly	hourly loading with fugitives and tank 121 landing	187.2	345.8	208.3			
Global Alb Hourly All Run 10	Hourly	hourly loading with fugitives and tank 120 landing	88.1	345.9	148.1			
Global Alb Hourly All Run 11	Hourly	hourly loading with fugitives, cleaning at tank 31, vapor space purge over 1 hour	26,635.4	8,661.7	30,317.0			
Global Alb Hourly All Run 12	Hourly	hourly loading with fugitives, cleaning at tank 32, vapor space purge over 1 hour	27,592.1	9,010.2	31,534.8			
Global Alb Hourly All Run 13	Hourly	hourly loading with fugitives, cleaning at tank 39, vapor space purge over 1 hour	17,250.9	5,998.6	19,638.7			
Global Alb Hourly All Run 14	Hourly	hourly loading with fugitives, cleaning at tank 114, vapor space purge over 1 hour	15,563.7	4,579.0	17,187.2			
Global Alb Hourly All Run 15	Hourly	hourly loading with fugitives, cleaning at tank 115, vapor space purge over 1 hour	30,308.4	3,383.5	33,230.0			
Global Alb Hourly All Run 16	Hourly	hourly loading with fugitives, cleaning at tank 117, vapor space purge over 1 hour	21,649.1	6,452.9	23,821.6			
Global Alb Hourly All Run 17	Hourly	hourly loading with fugitives, cleaning at tank 118, vapor space purge over 1 hour	8,379.5	2,452.7	9,166.2			
Global Alb Hourly All Run 18	Hourly	hourly loading with fugitives, cleaning at tank 119, vapor space purge over 1 hour	5,369.7	1,583.8	5,913.0			
Global Alb Hourly All Run 19	Hourly	hourly loading with fugitives, cleaning at tank 121, vapor space purge over 1 hour	30,660.2	9,105.9	33,752.2			
Global Alb Hourly All Run 20	Hourly	hourly loading with fugitives, cleaning at tank 120, vapor space purge over 1 hour	3,110.2	1,068.7	3,550.2			
Global Alb Hourly Run 220	Hourly	hourly loading no fugitives, cleaning at tank 31, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	38.5					
Global Alb Hourly Run 221	Hourly	hourly loading no fugitives, cleaning at tank 32, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	38.2					
Global Alb Hourly Run 222	Hourly	hourly loading no fugitives, cleaning at tank 39, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	39.4					
Global Alb Hourly Run 223	Hourly	hourly loading no fugitives, cleaning at tank 120, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	18.80					
Global Alb Hourly Run 224	Hourly	hourly loading no fugitives, cleaning at tank 114, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	43.9					
Global Alb Hourly Run 225	Hourly	hourly loading no fugitives, cleaning at tank 115, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	67.3					
Global Alb Hourly Run 226	Hourly	hourly loading no fugitives, cleaning at tank 117, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	38.8					
Global Alb Hourly Run 227	Hourly	hourly loading no fugitives, cleaning at tank 118, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	34.40					

Summary of Model Results[1]

File Name	Annual or Hourly	Overall Comments	Benzene, all source group, ug/m^3	Xylenes, all source group, ug/m^3	Toluene, all source group, ug/m^3	Hexane, all source group, ug/m^3	Ethylbenzene, all source group, ug/m^3	2,2,4-TMP, all source group, ug/m^3
Global Alb Hourly Run 228	Hourly	hourly loading no fugitives, cleaning at tank 119, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	22.10					
Global Alb Hourly Run 229	Hourly	hourly loading no fugitives, cleaning at tank 121, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer	70.7					
Global Alb Hourly Run 230	Hourly	hourly loading no fugitives, cleaning at tank 31, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 231	Hourly	hourly loading no fugitives, cleaning at tank 32, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 232	Hourly	hourly loading no fugitives, cleaning at tank 39, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		60.7				
Global Alb Hourly Run 233	Hourly	hourly loading no fugitives, cleaning at tank 120, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 234	Hourly	hourly loading no fugitives, cleaning at tank 114, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 235	Hourly	hourly loading no fugitives, cleaning at tank 115, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 236	Hourly	hourly loading no fugitives, cleaning at tank 117, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 237	Hourly	hourly loading no fugitives, cleaning at tank 118, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 238	Hourly	hourly loading no fugitives, cleaning at tank 119, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 239	Hourly	hourly loading no fugitives, cleaning at tank 121, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer		52.8				
Global Alb Hourly Run 240	Hourly	hourly loading no fugitives, cleaning at tank 31, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			44.2			
Global Alb Hourly Run 241	Hourly	hourly loading no fugitives, cleaning at tank 32, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			43.7			
Global Alb Hourly Run 242	Hourly	hourly loading no fugitives, cleaning at tank 39, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			59.4			
Global Alb Hourly Run 243	Hourly	hourly loading no fugitives, cleaning at tank 120, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			29.3			
Global Alb Hourly Run 244	Hourly	hourly loading no fugitives, cleaning at tank 114, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			51.3			
Global Alb Hourly Run 245	Hourly	hourly loading no fugitives, cleaning at tank 115, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			76.1			
Global Alb Hourly Run 246	Hourly	hourly loading no fugitives, cleaning at tank 117, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			44.6			
Global Alb Hourly Run 247	Hourly	hourly loading no fugitives, cleaning at tank 118, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			44.2			
Global Alb Hourly Run 248	Hourly	hourly loading no fugitives, cleaning at tank 119, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			31.6			
Global Alb Hourly Run 249	Hourly	hourly loading no fugitives, cleaning at tank 121, vapor space purge over 1 hour, 98% control during vapor space purge using therma oxidizer			79.9			

1 = For the annual runs, the maximum offsite concentration during the 5 year period is provided. For the hourly runs, the max 1-hr offsite concentration during the 5 year period is provided.

Attachment 6

Results for H_2S

Summary of Model Results[1]

File Name	Annual or Hourly	Overall Comments	H_2S, all source group, ug/m^3
Global Albany H_2S Annual	Annual	Annual emission rates no fugitives	0.03
Global Albany H_2S Annual fug	Annual	Annual emission rates with marine fugitives	0.03
Global Albany H_2S Hourly Run 0	Hourly	Hourly emission rates with fugitives, no cleanings or landings	0.84
Global Albany H_2S Hourly Run 1	Hourly	Hourly emission rates with fugitives and landing at tank 32 (worst-case gasoline tank from benzene model)	58.9
Global Albany H_2S Hourly Run 2	Hourly	Hourly emission rates with fugitives and landing at tank 117 (worst-case blendstock tank from benzene model)	52.3
Global Alb H_2S Hourly Run 3	Hourly	Hourly emission rates with fugitives and vapor space purge during cleaning at tank 32 (worst-case gasoline tank from benzene model)	7,455.1
Global Alb H_2S Hourly Run 4	Hourly	Hourly emission rates with fugitives and vapor space purge during cleaning at tank 121 (worst-case blendstock tank from benzene model)	7,127

1 = For the annual runs, the maximum offsite concentration during the 5 year period is provided. For the hourly runs, the max 1-hr offsite concentration during the 5 year period is provided.

Attachment XV

Modeling Plumes

Hourly Baseline - Benzene
No cleanings or landings

PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL

Max: 28 [ug/m^3] at (601782.28, 4720989.70)

Model: AERMOD MPI Version 22112

otfile List: GLOBAL ALB HOURLY ALL RUN 0.AD\01H1GALL.PLT

Output Type: Concentration

GH 1-HR VALUES FOR SOURCE GROUP: ALL

Max: 28.04331 [ug/m^3] at (601782.28, 4720989.70)

Worst Case Annual Benzene Model

PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL

Max: 0.293 [ug/m^3] at (602011.92, 4720351.97)

Model: AERMOD MPI Version 22112

X: 600387.39 [m] Y: 4721398.26 [m]

lotfile List: GLOBAL ALB ANNUAL ALL RUN 8.AD\AN00GALL.PLT

Output Type: Concentration

ALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL

Max: 0.2926 [ug/m^3] at (602011.92, 4720351.97)

Annual Benzene Model assuming no cleanings or landings

PLOT FILE OF ANNUAL VALUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL

Max: 0.184 [ug/m^3] at (602011.92, 4720351.97)

Model: AERMOD MPI Version 22112

lotfile List: GLOBAL ALB ANNUAL ALL RUN 10.AD\AN00GALL.PLT

Output Type: Concentration

LUES AVERAGED ACROSS 5 YEARS FOR SOURCE GROUP: ALL

Max: 0.18389 [ug/m^3] at (602011.92, 4720351.97)

Attachment XVI

Maximum Short-term Benzene Emission Rates for Tank Refills and Cleanings

Maximum Short-term Benzene Emission Rates for Tank Refills and Cleanings
Emission rates that pass model for each month

Tank	Month	Value that Passes for Refill in Given Month (lb/hr)	Value that Passes for Controlled Cleaning in Given Month (lb/hr)[1]
31	January	0.18136	N/A - Passes Model
31	February	0.2056	N/A - Passes Model
31	March	0.16707	N/A - Passes Model
31	April	0.26945	N/A - Passes Model
31	May	0.199927	N/A - Passes Model
31	June	0.197623	0.249655527
31	July	0.191487	0.256347
31	August	0.266099	0.24481823
31	September	0.2236987	0.242351109
31	October	0.153262	N/A - Passes Model
31	November	0.1874966	N/A - Passes Model
31	December	0.1632428	N/A - Passes Model
32	January	0.2123877	N/A - Passes Model
32	February	0.2065167	N/A - Passes Model
32	March	0.154556	N/A - Passes Model
32	April	0.225035	N/A - Passes Model
32	May	0.174947	N/A - Passes Model
32	June	0.1866589	0.235357
32	July	0.1847927	0.236003
32	August	0.20854027	0.2289614
32	September	0.1815158	0.232027
32	October	0.1554019	N/A - Passes Model
32	November	0.228017	N/A - Passes Model
32	December	0.1611252	N/A - Passes Model
39	January	0.19744958	N/A - Passes Model
39	February	0.2449646	N/A - Passes Model
39	March	0.309294	N/A - Passes Model
39	April	0.2359436	N/A - Passes Model
39	May	0.321661	N/A - Passes Model
39	June	0.2793019	0.2281318
39	July	0.2434566	0.224603
39	August	0.24788353	0.211787
39	September	0.26952	0.2152724
39	October	0.28028295	N/A - Passes Model
39	November	0.271344	N/A - Passes Model
39	December	0.25519083	N/A - Passes Model
120	January	0.3030807	N/A - Passes Model
120	February	0.3880615	N/A - Passes Model
120	March	0.399009	N/A - Passes Model
120	April	0.4131778	N/A - Passes Model
120	May	0.409195	N/A - Passes Model
120	June	0.43075835	N/A - Passes Model
120	July	0.3971246	N/A - Passes Model
120	August	0.3950467	N/A - Passes Model
120	September	0.396398	N/A - Passes Model

1 = N/A - Passes Model indicates that the model passed under worst case (1.8 wt%) benzene assumptions.

ATTACHMENT A
Emission rates that pass model for each month

Tank	Month	Value that Passes for Refill in Given Month (lb/hr)	Value that Passes for Controlled Cleaning in Given Month (lb/hr)[1]
120	October	0.395835	N/A - Passes Model
120	November	0.397206	N/A - Passes Model
120	December	0.398206	N/A - Passes Model
114	January	0.310277	N/A - Passes Model
114	February	0.2178502	N/A - Passes Model
114	March	0.3687577	N/A - Passes Model
114	April	0.23601	N/A - Passes Model
114	May	0.398004	0.221853
114	June	0.436524	0.2472804
114	July	0.355614	0.2136376
114	August	0.3873946	0.219312
114	September	0.253614	0.2198611
114	October	0.2973013	N/A - Passes Model
114	November	0.396876	N/A - Passes Model
114	December	0.305584	N/A - Passes Model
115	January	0.2271075	N/A - Passes Model
115	February	0.248271	N/A - Passes Model
115	March	0.2224849	N/A - Passes Model
115	April	0.33184	0.212252
115	May	0.248749	0.236676
115	June	0.249682	0.241726
115	July	0.23786	0.21748
115	August	0.319674	0.213419
115	September	0.194072	0.214467
115	October	0.218239	0.2192924
115	November	0.206163	0.226913
115	December	0.269567	N/A - Passes Model
117	January	0.2042329	N/A - Passes Model
117	February	0.2200619	N/A - Passes Model
117	March	0.169627	N/A - Passes Model
117	April	0.242102	N/A - Passes Model
117	May	0.2136175	N/A - Passes Model
117	June	0.197666	0.196361
117	July	0.1868254	0.1976813
117	August	0.248203	0.199485
117	September	0.2738947	0.196242
117	October	0.1679948	N/A - Passes Model
117	November	0.2212611	N/A - Passes Model
117	December	0.1641477	N/A - Passes Model
118	January	0.2712149	N/A - Passes Model
118	February	0.28666	N/A - Passes Model
118	March	0.351896	N/A - Passes Model
118	April	0.35779	N/A - Passes Model
118	May	0.35197	N/A - Passes Model
118	June	0.310569	0.1864352

1 = N/A - Passes Model indicates that the model passed under worst case (1.8 wt%) benzene assumptions.

ATTACHMENT A

Emission rates that pass model for each month

Tank	Month	Value that Passes for Refill in Given Month (lb/hr)	Value that Passes for Controlled Cleaning in Given Month (lb/hr)[1]
118	July	0.327469	0.1839057
118	August	0.352797	0.1780886
118	September	0.332413	0.1827436
118	October	0.351574	N/A - Passes Model
118	November	0.355718	N/A - Passes Model
118	December	0.304204	N/A - Passes Model
119	January	0.409281	N/A - Passes Model
119	February	0.285819	N/A - Passes Model
119	March	0.410459	N/A - Passes Model
119	April	0.311328	N/A - Passes Model
119	May	0.4139964	N/A - Passes Model
119	June	0.449732	N/A - Passes Model
119	July	0.3978	N/A - Passes Model
119	August	0.41429	N/A - Passes Model
119	September	0.36475	N/A - Passes Model
119	October	0.319549	N/A - Passes Model
119	November	0.375371	N/A - Passes Model
119	December	0.343385	N/A - Passes Model
121	January	0.219633	N/A - Passes Model
121	February	0.2585262	N/A - Passes Model
121	March	0.23977	N/A - Passes Model
121	April	0.305566	0.2053122
121	May	0.22249155	0.214755
121	June	0.284176	0.220439
121	July	0.2581097	0.207047
121	August	0.309774	0.200547
121	September	0.2364688	0.1974176
121	October	0.194625	0.198385
121	November	0.237605	0.20955215
121	December	0.21153	N/A - Passes Model

1 = N/A - Passes Model indicates that the model passed under worst case (1.8 wt%) benzene assumptions.

Attachment XVII

Calculation Protocols

Refilling Losses After Cleaning

Proposed permit condition parameters to be used for hourly emission calculations:

- Refill rate – the expected delivery rate of product. For the predicted calculation, this is the expected delivery rate of the product. For the actual calculation, this is based on the change in the gauge over the time period of the refill or a flowmeter. The start and stop time of the refill period will be recorded.
- Temperature – For the predicted calculation, the expected temperature of the incoming product or the average of the daily average for the seven day time period prior to the scheduled day for the vapor space purge, based on the past five (5) years of met data, whichever is higher or the average of the predicted temperature for the 7 day week the work is anticipated as projected by the National Weather Service. (Note – there is no liquid in the tank or remaining vapors, so it is the contribution of the incoming liquid per AP-42). For the actual calculation, the instantaneous temperature of the product following refill of the tank or the average of the daily ambient average of the previous seven (7) day period based on the Albany Weather Station. This temperature is used as T_V in AP-42 Chapter 7 Equation 3-18 and P_{VA} in AP-42 Chapter 7 Equation 1-25.
- Benzene Content – percent liquid by volume to be documented by Certificate of Analysis or sample from the tank/vessel/rail car providing the refill product. Benzene content is used for Z_{Lbz} in AP-42 Equation 40-4 (see Section 4 of this document).

Supporting Equations for emissions calculations:

AP-42 Chapter 7, Equation 3-18 to Calculate Filling Losses

$$L_{FL} = \frac{P_{VA} V_V M_V C_{sf} S}{R T_V}$$

where:

L_{FL} = VOC filling loss during roof landing, lb

P_{VA} = true vapor pressure of the liquid within the tank, psia (calculated using equation 1-25)

V_V = volume of the vapor space, ft^3, set equal to volume refilled in one hour to support modeling calculations, unless tank can be refilled in less than an hour. In this case, equation below will be used

M_V = stock vapor molecular weight, lb/lb-mol

C_{sf} = filling saturation correction factor for wind, dimensionless (value = 1 for IFR and domed EFR)

S = filling saturation factor (0.15 after cleaning)

R = ideal gas constant, 10.731 (psia-ft^3)/(lb-mol-°R)

T_V = average temperature of the vapor below the floating roof (see Equation 3-6), °R – per Equation 3-6, T_V is equal to the average vapor temperature, °R, given that the tank bottom is in contact with the ground, the temperature is assumed to be equal to ground temperature, which is taken as the average ambient temperature for the month in which the landing occurs, unless a different temperature is known.

Vapor Space Volume Calculation (in cases where tank would refill in less than an hour):

$$V_V = \frac{\pi}{4} D^2 h_v$$

where:

D = tank diameter

h_v = height of vapor space, ft

$$h_v = h_d - h_L$$

where:

h_d = height of deck, ft

h_L = height of liquid, ft

AP-42 Chapter 7, Equation 1-25 (this equation is not for maintenance activities so we would change what temperature we use to Taa)

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

where:

A = constant in the vapor pressure equation, dimensionless

B = constant in the vapor pressure equation, °R

T_{LA} = average daily liquid surface temperature, °R, temperature assumed for this equation will vary based on the type of maintenance activity, as discussed above

Equations to Determine Vapor Pressure Constant A, AP-42 Chapter 7 Figure 7.1-15, Refined Petroleum Stocks

$$A = 15.64 - 1.854\ S^{0.5} - (0.8742 - 0.3280\ S^{0.5})\ \ln{(RVP)}$$

Equations to Determine Vapor Pressure Constant B, AP-42 Chapter 7 Figure 7.1-15, Refined Petroleum Stocks

$$B = 8742 - 1042\,S^{0.5} - (1049 - 179.4\,S^{0.5})\ln(RVP)$$

Equations to Determine Vapor Pressure Constant A, AP-42 Chapter 7 Figure 7.1-16, Crude Oil Stocks

$$A = 12.82 - 0.9672\ln(RVP)$$

Equations to Determine Vapor Pressure Constant B, AP-42 Chapter 7 Figure 7.1-16, Crude Oil Stocks

$$B = 7261 - 1216\ln(RVP)$$

Benzene Losses During Refill

$$L_{FLB} = L_{FL} Z_{Vbz}$$

L_{FLB} = Benzene Filling loss during roof landing, lb

Z_{Vbz} = weight fraction of benzene in vapor (lb/lb) (see calculation below)

Benzene Vapor Weight Fraction Calculation

Parameters to be used for emission calculations:

- Benzene Content (Z_{Lbz}) – liquid weight fraction of benzene in liquid documented by Certificate of Analysis or sample collection (as outlined in refill section above)
- Temperature – Depends on situation (as outlined in refill section above)

Supporting Equations for emissions calculations:

AP-42 Chapter 7, Equation 40-6 (using benzene as the component):

$$Z_{Vbz} = \frac{y_{bz} M_{bz}}{M_V}$$

where:

Z_{Vbz} = vapor weight fraction of benzene (lb/lb)

y_{bz} = vapor mole fraction of benzene, lb-mol/lb-mol

M_{bz} = molecular weight of benzene, lb/lb-mol (78.11 lb/lb-mol)

M_V = molecular weight of vapor stock, lb/lb-mol

AP-42 Chapter 7, Equation 40-5 (using benzene as the component):

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

where:

yi = vapor mole fraction of benzene, lb-mole/lb-mole

P_{bz} = partial pressure of benzene, psia

P_{VA} = true vapor pressure of liquid mixture, psia (see Equation 1-25 in refill section above)

AP-42, Chapter 7, Equation 40-3 (using benzene as the component):

$$P_{bz} = P\, x_{bz}$$

where:

Pbz = partial pressure of benzene, psia

P = vapor pressure of pure benzene, psia

x_{bz} = liquid mole fraction of benzene, lb-mol/lb-mol

Antoine's equation (temperature will depend on situation)[1]:

$$P = (0.019337)10\text{^}\left[A - \frac{B}{T \quad + C}\right]$$

where:

A = constant in vapor pressure equation, dimensionless (6.906 for benzene)

B = constant in vapor pressure equation, °C (1211°C for benzene)

---

[1] See AP-42 Chapter 7, Footnote to Table 7.1-3

C = constant in vapor pressure equation, °C (220.79°C for benzene)

T = temperature depends on situation – see AP-42, °C

AP-42 Chapter 7, Equation 40-4 (using benzene as the component):

$$x_{bz} = \frac{Z_{Lbz} M_L}{M_{bz}}$$

where:

x_{bz} = liquid mole fraction of benzene, lb-mole/lb-mole

Z_{Lbz} = weight fraction of benzene in the liquid, lb/lb

M_L = molecular weight of liquid stock, lb/lb-mol

M_{bz} = molecular weight of benzene, lb/lbmol (78.11 lb/lb-mol)

Refill After a Cleaning Example Scenario

Variables are defined as follows for the example refill after an IFR cleaning:

- V_v (volume of vapor space, set equal to volume refilled in one hour): 10,114.25 ft^3 (1500 barrels per hour)
- RVP: 9
- Mv (stock vapor molecular weight): 68 lb/lbmol
- C_{sf} (filling saturation correction factor for wind) = 1
- S (saturation factor, after cleaning): 0.15
- A (constant, assuming RVP 9): 11.756
- B (constant, assuming RVP 9): 5315.1°R

Temperature calculation based on daily averages from past 5 years of met data (this is for example purposes only and is not intended to match a specific set of met data):

In this example, the assumption is that the refill would occur on July 15, 2023. Assuming that met data would be available for the time period from 2017 through 2021, the following steps would be taken to calculate the temperature:

- The Daily Average for each of the following days in 2017, 2018, 2019, 2020, and 2021 would be determined based on historical met data:
    - July 8
    - July 9
    - July 10

  - July 11
  - July 12
  - July 13
  - July 14
- The average for each date would be calculated based on the 5 year period
- The overall average of the daily averages would be calculated

This example assumes the following daily average temperatures for each date. The average of the daily averages was then calculated, as shown at the bottom of the table. This temperature would then be converted from 73.393°F to 533.1°R. For this example, it is assumed that the expected temperature of the incoming product would be 70°F, so the average of the daily averages would be used since it is higher.

Date	Average Temperature (°F)
July 8, 2017	69.33
July 9, 2017	70.08
July 10, 2017	73.63
July 11, 2017	74.47
July 12, 2017	75.1
July 13, 2017	67.4
July 14, 2017	65.58
July 8, 2018	72.38
July 9, 2018	76.83
July 10, 2018	76.73
July 11, 2018	74.08
July 12, 2018	72.79
July 13, 2018	76.25
July 14, 2018	78.33
July 8, 2019	71.54
July 9, 2019	74.33
July 10, 2019	76.17
July 11, 2019	77.29
July 12, 2019	74.67
July 13, 2019	76.17
July 14, 2019	77.42
July 8, 2020	77.53
July 9, 2020	80.93
July 10, 2020	79.5
July 11, 2020	79.79
July 12, 2020	80.23
July 13, 2020	78.13
July 14, 2020	74.34
July 8, 2021	63.54

Date	Average Temperature (°F)
July 9, 2021	69.91
July 10, 2021	67.46
July 11, 2021	62.97
July 12, 2021	64.98
July 13, 2021	68.25
July 14, 2021	70.61
AVERAGE	**73.393**

The above variables would be used to calculate the VOC emissions from the tank in a one hour period as follows:

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

$$P_{VA} = exp\left[11.756 - \frac{5315.1\,°R}{533.1\,°R}\right]$$

$$P_{VA} = 5.965\;psia$$

$$L_{FL} = \frac{5.965\;psia * 10114.25\;ft3 * 68\frac{lb}{lbmol} * 1 * 0.15}{10.731\frac{\mathrm{psia-ft3}}{\mathrm{lb-mol-°R}} * 533.1\,°R}$$

$$L_{FL} = 107.6\;lb/hr$$

To confirm that this does not exceed the total filling losses that could be generated for the entire vapor space during the refill, the following calculation would be completed (0 ft liquid height after cleaning assumed):

$$h_v = h_d - h_L$$

$$h_v = 6\;ft - 0\;ft$$

$$h_v = 6\;ft$$

$$V_V = \frac{\pi}{4} D^2 h_v$$

$$V_V = \frac{\pi}{4}(110\, ft)^2 (6\, ft)$$

$$V_V = 57{,}019.9\, ft^3$$

Since the calculated vapor space is significantly greater than the refill rate, the volume refilled in one hour is used for the calculation. If the vapor space volume were smaller than the refill rate, then the filling losses would be calculated with the vapor space volume.

In this example, the benzene content is based on Certificate of Analyses for two (2) shipments of product. Terminal records indicate the following:

- The product in the tank consists of 60% of Shipment #1 and 40% of Shipment #2
- The benzene content for Shipment #1 is 0.8 volume % or 1.05 weight %
- The benzene content for Shipment #2 is 0.6 volume % or 0.788 weight %

The benzene content would be calculated as follows:

Benzene content of the mixture = Benzene Weight % in Shipment #1 * % of Shipment #1 in tank + Benzene Weight % in Shipment #2 * % of Shipment #2 in tank

Benzene content of the mixture = 1.05 wt% * 0.6 + 0.788 wt% * 0.4 = 0.9452 wt%, or 0.009452 weight fraction

The value of 0.009452 would then be used as the Z_{Lbz} (liquid weight fraction variable) for the calculations, as follows, given that molecular weight of benzene is 78.11 lb/lbmol:

To calculate liquid mole fraction of benzene:

$$x_{bz} = \frac{Z_{Lbz} M_L}{M_{bz}}$$

$$x_{bz} = \frac{0.009452 * 92\, lb/lbmol}{78.11 \frac{lb}{lbmol}}$$

$$x_{bz} = 0.0111$$

To calculate benzene vapor pressure:

$$P = (0.019337)10\wedge \left[A - \frac{B}{T + C}\right]$$

$$P = (0.019337)10^{\wedge}\left[6.906 - \frac{1211\,℃}{23\,℃ + 220.79\,℃}\right]$$

$$P = 1.68\,psia$$

To calculate benzene partial pressure:

$$P_{bz} = P\,x_{bz}$$

$$P_{bz} = 1.68\,psia * 0.0111$$

$$P_{bz} = 0.0186\,psia$$

To calculate benzene vapor mole fraction:

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

$$y_{bz} = \frac{0.0186\,psia}{5.965\,psia}$$

$$y_{bz} = 0.00312$$

To calculate benzene vapor weight fraction:

$$Z_{Vbz} = \frac{y_{bz}M_{bz}}{M_V}$$

$$Z_{Vbz} = \frac{0.00312 * 78.11\,lb/lbmol}{68\,lb/lbmol}$$

$$Z_{Vbz} = 0.00359$$

$$L_{FLB} = L_{FL}Z_{Vbz}$$

$$L_{FLB} = 107.6\,\frac{lb}{hr} * 0.00359$$

$$L_{FLB} = 0.386\ lb/hr$$

Refilling Losses After In-Service Landing

Proposed permit condition parameters to be used for hourly emission calculations:

- Refill rate – the expected delivery rate of product. For the predicted calculation, this is the expected delivery rate of the product. For the actual calculation, this is based on the change in the gauge over the time period of the refill or a flowmeter. The start and stop time of the refill period will be recorded.
- Temperature – For predicted calculations, the average of the temperature of the product in the tank or the average ambient temperature, whichever is higher and the expected temperature of the incoming product. The ambient temperature will be calculated based on average of the daily average for the seven day time period prior to the scheduled day for the vapor space purge, based on the past five (5) years of met data or the average of the predicted temperature for the 7 day week the work is anticipated based on the National Weather Service. (Note – there is contribution from both the arrival component and the generated component per AP-42) This temperature is used as T_V in AP-42 Chapter 7 Equation 3-18 and to calculate P_{VA} in AP-42 Chapter 7 Equation 1-25. For the actual calculation, the temperature of the product remaining in the tank or the average of the daily ambient average of the previous seven (7) day period based on the Albany Weather Station would be used. For arrival and generated components for a change in service, the calculations would be done separately for each product.
- Benzene Content – percent liquid by volume to be documented by Certificate of Analysis or sample from the current product in the tank and from the tank/vessel/rail car providing the refill product. If the arrival component (based on current product in tank prior to refill) contains product from multiple product shipments, either a weighted average of the benzene content from each shipment will be calculated based on the volume from each shipment within the tank and the Certificate of Analysis for each shipment or the maximum benzene from the combined shipments will be used. Alternatively, instead of COA, the benzene content will be based on a sample taken from the tank that is representative of the contents. In the case where there is not a change in service, either the maximum benzene content between the current product in the tank and the refill product will be used or a weighted average calculation will be completed based on the product remaining in the tank and the volume necessary to complete the refill. Benzene content is used for Z_{Lbz} in AP-42 Equation 40-4 (see Section 4 of this document).
- Control Efficiency – for predicted calculations, for tanks with a guide pole, there is an option of controlling the refill using a collection efficiency of 75% and a destruction efficiency of 98%. For actual calculations, the collection efficiency will remain 75% and the destruction efficiency documented by the cleaning contractor will be used, which is based on reading of the LEL in the inlet to the control device and the outlet VOC concentration.

Supporting Equations for emissions calculations:

AP-42 Chapter 7, Equation 3-18 to Calculate VOC Losses

$$L_{FL} = \frac{P_{VA} V_V M_V C_{sf} S}{R T_V}$$

where:

L_{FL} = VOC filling loss during roof landing, lb

P_{VA} = true vapor pressure of the liquid within the tank, psia (calculated using equation 1-25)

V_V = volume of the vapor space, ft^3, set equal to volume refilled in one hour to support modeling calculations, unless tank can be refilled in less than an hour. In this case, equation below will be used

M_V = stock vapor molecular weight, lb/lb-mol

C_{sf} = filling saturation correction factor for wind, dimensionless (value = 1 for IFR and domed EFR)

S = filling saturation factor (0.5 for partial liquid heel, 0.6 for full liquid heel)

R = ideal gas constant, 10.731 (psia-ft^3)/(lb-mol-°R)

T_V = average temperature of the vapor below the floating roof (see Equation 3-6), °R – per Equation 3-6, T_V is equal to the average vapor temperature, °R, given that the tank bottom is in contact with the ground, the temperature is assumed to be equal to ground temperature, which is taken as the average ambient temperature for the month in which the landing occurs, unless a different temperature is known

Per Ap-42, page 7.1-45, In the event of a change of service during the landing event, the equation should be run separately for the arrival and generated components. The arrival component should be based on the liquid properties of the prior service and a saturation factor of (Csf S – 0.15). The generated component should be based on the properties of the incoming liquid and a saturation factor of 0.15. Internal or Domed External Floating Roof Tank with a Liquid Heel.

<u>Vapor Space Volume Calculation (in cases where tank would refill in less than an hour):</u>

$$V_V = \frac{\pi}{4} D^2 h_v$$

where:

D = tank diameter

h_v = height of vapor space, ft

$$h_v = h_d - h_L$$

where:

h_d = height of deck, ft

h_L = height of liquid, ft

<u>AP-42 Chapter 7, Equation 1-25 (this equation is not for maintenance activities so we would change what temperature we use to Taa)</u>

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

where:

A = constant in the vapor pressure equation, dimensionless

B = constant in the vapor pressure equation, °R

T_{LA} = average daily liquid surface temperature, °R, temperature assumed for this equation will vary based on the type of maintenance activity, as discussed above

Equations to Determine Vapor Pressure Constant A, AP-42 Chapter 7 Figure 7.1-15, Refined Petroleum Stocks

$$A = 15.64 - 1.854\, S^{0.5} - (0.8742 - 0.3280\, S^{0.5}) \ln{(RVP)}$$

Equations to Determine Vapor Pressure Constant B, AP-42 Chapter 7 Figure 7.1-15, Refined Petroleum Stocks

$$B = 8742 - 1042\, S^{0.5} - (1049 - 179.4\, S^{0.5}) \ln{(RVP)}$$

Equations to Determine Vapor Pressure Constant A, AP-42 Chapter 7 Figure 7.1-16, Crude Oil Stocks

$$A = 12.82 - 0.9672 \ln{(RVP)}$$

Equations to Determine Vapor Pressure Constant B, AP-42 Chapter 7 Figure 7.1-16, Crude Oil Stocks

$$B = 7261 - 1216 \ln{(RVP)}$$

Benzene Losses During Refill

$$L_{FLB} = L_{FL} Z_{Vbz}$$

L_{FLB} = Benzene Filling loss during roof landing, lb

Z_{Vbz} = weight fraction of benzene in vapor (lb/lb) (see calculation below)

Benzene Vapor Weight Fraction Calculation

Parameters to be used for emission calculations:

- Benzene Content (Z_{Lbz}) – liquid weight fraction of benzene in liquid documented by Certificate of Analysis or sample collection (as outlined in refill section)
- Temperature – Depends on situation (as outlined in refill section)

Supporting Equations for emissions calculations:

AP-42 Chapter 7, Equation 40-6 (using benzene as the component):

$$Z_{Vbz} = \frac{y_{bz} M_{bz}}{M_V}$$

where:

Z_{Vbz} = vapor weight fraction of benzene (lb/lb)

y_{bz} = vapor mole fraction of benzene, lb-mol/lb-mol

M_{bz} = molecular weight of benzene, lb/lb-mol (78.11 lb/lb-mol)

M_V = molecular weight of vapor stock, lb/lb-mol

AP-42 Chapter 7, Equation 40-5 (using benzene as the component):

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

where:

yi = vapor mole fraction of benzene, lb-mole/lb-mole

P_{bz} = partial pressure of benzene, psia

P_{VA} = true vapor pressure of liquid mixture, psia (see Equation 1-25 in refill section)

AP-42, Chapter 7, Equation 40-3 (using benzene as the component):

$$P_{bz} = P\, x_{bz}$$

where:

Pbz = partial pressure of benzene, psia

P = vapor pressure of pure benzene, psia

x_{bz} = liquid mole fraction of benzene, lb-mol/lb-mol

Antoine's equation (temperature will depend on situation)[1]:

$$P = (0.019337)10\hat{}\left[A - \frac{B}{T \quad + C}\right]$$

where:

A = constant in vapor pressure equation, dimensionless (6.906 for benzene)

B = constant in vapor pressure equation, °C (1211°C for benzene)

C = constant in vapor pressure equation, °C (220.79°C for benzene)

T = temperature depends on situation – see AP-42, °C

AP-42 Chapter 7, Equation 40-4 (using benzene as the component):

$$x_{bz} = \frac{Z_{Lbz} M_L}{M_{bz}}$$

where:

x_{bz} = liquid mole fraction of benzene, lb-mole/lb-mole

Z_{Lbz} = weight fraction of benzene in the liquid, lb/lb

M_L = molecular weight of liquid stock, lb/lb-mol

M_{bz} = molecular weight of benzene, lb/lbmol (78.11 lb/lb-mol)

Refill After a Landing Example Scenario #1

Variables are defined as follows for the example refill after an IFR landing that includes a change in service:

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[1] See AP-42 Chapter 7, Footnote to Table 7.1-3

- V_v (volume of vapor space, set equal to volume refilled in one hour): 10,114.25 ft^3 (1500 barrels per hour)
- Tank Diameter: 110 ft
- Arrival Component RVP: 9 (Gasoline)
- Generated Component RVP: 11 (Crude)
- Mv (stock vapor molecular weight, arrival component): 68 lb/lbmol
- Mv (stock vapor molecular weight, generated component): 50 lb/lbmol
- C_{sf} (filling saturation correction factor for wind) = 1
- S (saturation factor): 0.5 for partial heel
- Deck Height: 3 ft
- Height of product remaining in tank: 0.25 ft
- A (constant, arrival component): 11.756
- B (constant, arrival component): 5315.1°R
- A (constant, generated component): 10.501
- B (constant, generated component): 4345.2°R
- Arrival Component temperature (average of daily average for 7 days prior to event based on previous 5 years of met data): calculated below
- Generated Component temperature (expected incoming product temperature): 75°F (23.9°C or 534.67°R)

Temperature calculation based on daily averages from past 5 years of met data (this is for example purposes only and is not intended to match a specific set of met data):

In this example, the assumption is that the refill would occur on July 15, 2023. Assuming that met data would be available for the time period from 2017 through 2021, the following steps would be taken to calculate the temperature:

- The Daily Average for each of the following days in 2017, 2018, 2019, 2020, and 2021 would be determined based on historical met data:
    - July 8
    - July 9
    - July 10
    - July 11
    - July 12
    - July 13
    - July 14
- The average for each date would be calculated based on the 5 year period
- The overall average of the daily averages would be calculated

This example assumes the following daily average temperatures for each date. The average of the daily averages was then calculated, as shown at the bottom of the table. This temperature would then be converted from 73.393°F to 533.1°R.

Date	Average Temperature (°F)
July 8, 2017	69.33
July 9, 2017	70.08

Date	Average Temperature (°F)
July 10, 2017	73.63
July 11, 2017	74.47
July 12, 2017	75.1
July 13, 2017	67.4
July 14, 2017	65.58
July 8, 2018	72.38
July 9, 2018	76.83
July 10, 2018	76.73
July 11, 2018	74.08
July 12, 2018	72.79
July 13, 2018	76.25
July 14, 2018	78.33
July 8, 2019	71.54
July 9, 2019	74.33
July 10, 2019	76.17
July 11, 2019	77.29
July 12, 2019	74.67
July 13, 2019	76.17
July 14, 2019	77.42
July 8, 2020	77.53
July 9, 2020	80.93
July 10, 2020	79.5
July 11, 2020	79.79
July 12, 2020	80.23
July 13, 2020	78.13
July 14, 2020	74.34
July 8, 2021	63.54
July 9, 2021	69.91
July 10, 2021	67.46
July 11, 2021	62.97
July 12, 2021	64.98
July 13, 2021	68.25
July 14, 2021	70.61
AVERAGE	**73.393**

The above variables would be used to calculate the VOC emissions from the tank in a one hour period as follows:

To calculate the true vapor pressure of the arrival component:

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

$$P_{VA} = exp\left[11.756 - \frac{5315.1\,°R}{533.1\,°R}\right]$$

$$P_{VA} = 5.965\,psia$$

To calculate the filling losses from the arrival component, where the saturation factor is determined by subtracting 0.15 from the overall saturation factor:

$$L_{FL} = \frac{5.965\,psia * 10114.25\,ft3 * 68\frac{lb}{lbmol} * 1 * (0.5 - 0.15)}{10.731\frac{\text{psia} - \text{ft3}}{\text{lb} - \text{mol} - °\text{R}} * 533.1\,°R}$$

$$L_{FL} = 251\,lb/hr$$

To confirm that this does not exceed the total filling losses that could be generated for the entire vapor space during the refill, the following calculation would be completed:

$$h_v = h_d - h_L$$

$$h_v = 3\,ft - 0.25\,ft$$

$$h_v = 2.75\,ft$$

$$V_V = \frac{\pi}{4}D^2 h_v$$

$$V_V = \frac{\pi}{4}(110\,ft)^2(2.75\,ft)$$

$$V_V = 26{,}134.1\,ft^3$$

Since the calculated vapor space is greater than the hourly refill rate, the volume refilled in one hour is used for the calculation. If the vapor space volume were smaller than the refill rate, then the filling losses would be calculated with the vapor space volume.

To calculate the true vapor pressure of the generated component:

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

$$P_{VA} = exp\left[10.501 - \frac{4345.2\,°R}{534.67\,°R}\right]$$

$$P_{VA} = 10.74\,psia$$

To calculate the filling losses from the generated component:

$$L_{FL} = \frac{10.74\,psia * 10114.25\,ft3 * 50\,\frac{lb}{lbmol} * 1 * 0.15}{10.731\,\frac{\text{psia} - \text{ft3}}{\text{lb} - \text{mol} - °\text{R}} * 534.67\,°R}$$

$$L_{FL} = 142\,lb/hr$$

Total of arrival and generated components VOC losses due to refill = 381.9 lb/hr

Benzene Content for Arrival Component

In this example, the benzene content is based on Certificate of Analyses for two (2) shipments of product. Terminal records indicate the following:

- The product in the tank consists of 60% of Shipment #1 and 40% of Shipment #2
- The benzene content for Shipment #1 is 0.8 volume % or 1.05 weight %
- The benzene content for Shipment #2 is 0.6 volume % or 0.788 weight %

The benzene content would be calculated as follows:

Benzene content of the mixture = Benzene Weight % in Shipment #1 * % of Shipment #1 in tank + Benzene Weight % in Shipment #2 * % of Shipment #2 in tank

Benzene content of the mixture = 1.05 wt% * 0.6 + 0.788 wt% * 0.4 = 0.9452 wt%, or 0.009452 weight fraction

The value of 0.009452 would then be used as the Z_{Lbz} (liquid weight fraction variable) for the calculations, as follows, given that molecular weight of benzene is 78.11 lb/lbmol:

To calculate liquid mole fraction of benzene:

$$x_{bz} = \frac{Z_{Lbz} M_L}{M_{bz}}$$

$$x_{bz} = \frac{0.009452 * 92\ lb/lbmol}{78.11 \frac{lb}{lbmol}}$$

$$x_{bz} = 0.0111$$

To calculate benzene vapor pressure:

$$P = (0.019337)10\text{^}\left[A - \frac{B}{T + C}\right]$$

$$P = (0.019337)10\text{^}\left[6.906 - \frac{1211\ ℃}{23\ ℃ + 220.79\ ℃}\right]$$

$$P = 1.68\ psia$$

To calculate benzene partial pressure:

$$P_{bz} = P\ x_{bz}$$

$$P_{bz} = 1.68\ psia * 0.0111$$

$$P_{bz} = 0.0186\ psia$$

To calculate benzene vapor mole fraction:

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

$$y_{bz} = \frac{0.0186\ psia}{5.965\ psia}$$

$$y_{bz} = 0.00312$$

To calculate benzene vapor weight fraction:

$$Z_{Vbz} = \frac{y_{bz}M_{bz}}{M_V}$$

$$Z_{Vbz} = \frac{0.00312 * 78.11\ lb/lbmol}{68\ lb/lbmol}$$

$$Z_{Vbz} = 0.00359$$

Benzene Content for Generated Component:

In this example, the liquid wt% of benzene in the crude to be filled in the tank is 0.4%.

To calculate liquid mole fraction of benzene:

$$x_{bz} = \frac{Z_{Lbz}M_L}{M_{bz}}$$

$$x_{bz} = \frac{0.004 * 207\ lb/lbmol}{78.11 \frac{lb}{lbmol}}$$

$$x_{bz} = 0.011$$

To calculate benzene vapor pressure (using the expected temperature of the incoming product):

$$P = (0.019337)10\char`^ \left[A - \frac{B}{T + C}\right]$$

$$P = (0.019337)10\char`^ \left[6.906 - \frac{1211\ ℃}{23.9\ ℃ + 220.79\ ℃}\right]$$

$$P = 1.75\ psia$$

To calculate benzene partial pressure:

$$P_{bz} = P\ x_{bz}$$

$$P_{bz} = 1.75\ psia * 0.011$$

$$P_{bz} = 0.01925\ psia$$

To calculate benzene vapor mole fraction:

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

$$y_{bz} = \frac{0.01925\ psia}{10.74\ psia}$$

$$y_{bz} = 0.00179$$

To calculate benzene vapor weight fraction:

$$Z_{Vbz} = \frac{y_{bz} M_{bz}}{M_V}$$

$$Z_{Vbz} = \frac{0.00179 * 78.11\ lb/lbmol}{50\ lb/lbmol}$$

$$Z_{Vbz} = 0.0028$$

Based on this calculation, the benzene refill losses after a landing with a change in service (over a one hour period) is as follows:

$$L_{FLB} = L_{FL} Z_{Vbz}$$

$$L_{FLB} = 251 \frac{lb}{hr} * 0.00359 + 142 \frac{lb}{hr} * 0.0028$$

$$L_{FLB} = 1.3\ lb/hr$$

Refill After a Landing Example Scenario #2

Variables are defined as follows for the example refill after an IFR landing for an RVP change:

- V_v (volume of vapor space, set equal to volume refilled in one hour): 10,114.25 ft^3 (1500 barrels per hour)
- Tank Diameter: 110 ft
- Current Product RVP: 13 (Gasoline)
- Product to be Refilled RVP: 9 (Gasoline)
- Mv (stock vapor molecular weight, Gasoline RVP 13): 62 lb/lbmol
- Mv (stock vapor molecular weight, Gasoline RVP 9): 68 lb/lbmol
- C_{sf} (filling saturation correction factor for wind) = 1
- S (saturation factor): 0.5 for partial heel
- Deck Height: 3 ft
- Height of product remaining in tank: 0.25 ft
- A (constant, Gasoline RVP 13): 11.644
- B (constant, Gasoline RVP 13): 5043.6°R
- A (constant, Gasoline RVP 9): 11.756
- B (constant, Gasoline RVP 9): 5315.1°R
- Current Product/ Gasoline RVP 13 temperature (average of daily average for 7 days prior to event based on previous 5 years of met data): calculated below
- Product to be refilled/ Gasoline RVP 9 temperature (expected incoming product temperature): predicted to be the same as the temperature calculated for the current product in this example

Temperature calculation based on daily averages from past 5 years of met data (this is for example purposes only and is not intended to match a specific set of met data):

In this example, the assumption is that the refill would occur on April 15, 2023. Assuming that met data would be available for the time period from 2018 through 2022, the following steps would be taken to calculate the temperature:

- The Daily Average for each of the following days in 2018, 2019, 2020, 2021, and 2022 would be determined based on historical met data:
    - April 8
    - April 9
    - April 10
    - April 11
    - April 12
    - April 13
    - April 14
- The average for each date would be calculated based on the 5 year period
- The overall average of the daily averages would be calculated

This example assumes the following daily average temperatures for each date. The average of the daily averages was then calculated, as shown at the bottom of the table. This temperature would then be converted from 48.343°F to 508.0°R. Since this is also the predicted temperature of the incoming product in this scenario, 508.0°R would also be the average temperature for use in the calculations.

Date	Average Temperature (°F)
April 8, 2018	29.0
April 9, 2018	33.5
April 10, 2018	37.0
April 11, 2018	35.5
April 12, 2018	41.5
April 13, 2018	51.5
April 14, 2018	38.5
April 8, 2019	51.5
April 9, 2019	53.0
April 10, 2019	41.0
April 11, 2019	39.5
April 12, 2019	50.0
April 13, 2019	63.0
April 14, 2019	52.0
April 8, 2020	51.0
April 9, 2020	45.5
April 10, 2020	42.5
April 11, 2020	41.0
April 12, 2020	46.5
April 13, 2020	56.5
April 14, 2020	46.0
April 8, 2021	54.5
April 9, 2021	58.0
April 10, 2021	61.5
April 11, 2021	59.5
April 12, 2021	46.5
April 13, 2021	49.0
April 14, 2021	57.0
April 8, 2022	51.0
April 9, 2022	44.0
April 10, 2022	42.5
April 11, 2022	45.0
April 12, 2022	55.5
April 13, 2022	59.0
April 14, 2022	63.5
AVERAGE	**48.343**

The above variables would be used to calculate the VOC emissions from the tank in a one hour period as follows:

To calculate the true vapor pressure:

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

$$P_{VA} = exp\left[11.644 - \frac{5043.6\,°R}{508.0\,°R}\right]$$

$$P_{VA} = 5.560\ psia$$

To calculate the filling losses from the RVP 13 gasoline component:

$$L_{FL} = \frac{5.560\ psia * 10{,}114.25\ ft3 * 62\frac{lb}{lbmol} * 1 * 0.5}{10.731\frac{\mathrm{psia - ft3}}{\mathrm{lb - mol - °R}} * 508.0\,°R}$$

$$L_{FL} = 319.8\ lb/hr$$

To confirm that this does not exceed the total filling losses that could be generated for the entire vapor space during the refill, the following calculation would be completed:

$$h_v = h_d - h_L$$

$$h_v = 3\ ft - 0.25\ ft$$

$$h_v = 2.75\ ft$$

$$V_V = \frac{\pi}{4}D^2h_v$$

$$V_V = \frac{\pi}{4}(110\ ft)^2(2.75\ ft)$$

$$V_V = 26{,}134.1\ ft^3$$

Since the calculated vapor space is greater than the refill rate, the volume refilled in one hour is used for the calculation. If the vapor space volume were smaller than the refill rate, then the filling losses would be calculated with the vapor space volume.

Benzene Content

In this example, the benzene content of the RVP 13 gasoline in the tank is based on Certificate of Analyses for two (2) shipments of product. Terminal records indicate the following:

- The product in the tank consists of 60% of Shipment #1 and 40% of Shipment #2
- The benzene content for Shipment #1 is 0.8 volume % or 1.05 weight %
- The benzene content for Shipment #2 is 0.6 volume % or 0.788 weight %

The benzene content would be calculated as follows:

Benzene content of the mixture = Benzene Weight % in Shipment #1 * % of Shipment #1 in tank + Benzene Weight % in Shipment #2 * % of Shipment #2 in tank

Benzene content of the mixture = 1.05 wt% * 0.6 + 0.788 wt% * 0.4 = 0.9452 wt%, or 0.009452 weight fraction

The COA for the refill/ incoming product indicates that the shipment is 0.5 wt%. The terminal is using the option to do a weighted average of the incoming product and the product in the tank. The remaining product in the tank prior to refill would be calculated as follows (based on 0.25 ft of product remaining in tank):

$$V = \frac{\pi}{4} D^2 h$$

$$V = \frac{\pi}{4} (110\ ft)^2 (0.25\ ft)$$

$$V = 2375.83\ ft^3$$

$$V = 17{,}772\ gal$$

The volume of product required for the refill would be estimated as follows for the predicted calculation (and actuals would be used for the actual calculation), based on a 3 ft roof height:

$$V = \frac{\pi}{4} D^2 h$$

$$V = \frac{\pi}{4}(110\,ft)^2(3\,ft)$$

$$V = 28{,}509.95\,ft^3$$

$$V = 213{,}269.3\,gal$$

Based on this calculation, the volume of the product within the tank would make up 7.7% of the total and the incoming product would make up the remaining 92.3%. The weighted average of the benzene content of the current and incoming product would then be calculated as follows:

Benzene content of the mixture = Benzene Weight % of Current Product * % of Current Product in tank + Benzene Weight % Incoming Product * % of Incoming Product in tank

Benzene content of the mixture = 0.9452 wt% * 0.077 + 0.5 wt% * 0.923 = 0.534 wt%, or 0.00534 weight fraction

The value of 0.00534 would then be used as the Z_{Lbz} (liquid weight fraction variable) for the calculations, as follows, given that molecular weight of benzene is 78.11 lb/lbmol:

To calculate liquid mole fraction of benzene:

$$x_{bz} = \frac{Z_{Lbz}M_L}{M_{bz}}$$

$$x_{bz} = \frac{0.00534 * 92\,lb/lbmol}{78.11\frac{lb}{lbmol}}$$

$$x_{bz} = 0.0063$$

To calculate benzene vapor pressure:

$$P = (0.019337)10^\wedge\left[A - \frac{B}{T + C}\right]$$

$$P = (0.019337)10^\wedge\left[6.906 - \frac{1211\,℃}{9.1\,℃ + 220.79\,℃}\right]$$

$$P = 0.84\,psia$$

To calculate benzene partial pressure:

$$P_{bz} = P\,x_{bz}$$

$$P_{bz} = 0.84\,psia * 0.0063$$

$$P_{bz} = 0.0053\,psia$$

To calculate benzene vapor mole fraction:

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

$$y_{bz} = \frac{0.0053\,psia}{5.560\,psia}$$

$$y_{bz} = 0.00095$$

To calculate benzene vapor weight fraction:

$$Z_{Vbz} = \frac{y_{bz}M_{bz}}{M_V}$$

$$Z_{Vbz} = \frac{0.00095 * 78.11\,lb/lbmol}{62\,lb/lbmol}$$

$$Z_{Vbz} = 0.0012$$

To calculate the hourly benzene losses:

$$L_{FLB} = L_{FL}Z_{Vbz}$$

$$L_{FLB} = 319.8\frac{lb}{hr} * 0.0012$$

$$L_{FLB} = 0.38\,lb/hr$$

The following calculation is provided for RVP 9 to show that the calculation for benzene would not be dependent on RVP.

To calculate the true vapor pressure of RVP 9 product:

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

$$P_{VA} = exp\left[11.756 - \frac{5315.1\ ^\circ R}{508.0\ ^\circ R}\right]$$

$$P_{VA} = 3.64\ psia$$

To calculate the filling losses from the incoming product:

$$L_{FL} = \frac{3.64\ psia * 10114.25\ ft3 * 68\ \frac{lb}{lbmol} * 1 * 0.5}{10.731\frac{\mathrm{psia - ft3}}{\mathrm{lb - mol - {}^\circ R}} * 508.0\ ^\circ R}$$

$$L_{FL} = 229.9\ lb/hr$$

Benzene Content for Incoming Product:

To calculate liquid mole fraction of benzene:

$$x_{bz} = \frac{Z_{Lbz}M_L}{M_{bz}}$$

$$x_{bz} = \frac{0.00534 * 92\ lb/lbmol}{78.11\frac{lb}{lbmol}}$$

$$x_{bz} = 0.0063$$

To calculate benzene vapor pressure:

$$P = (0.019337)10\hat{}\left[A - \frac{B}{T + C}\right]$$

$$P = (0.019337)10\hat{}\left[6.906 - \frac{1211\ ^\circ C}{9.1\ ^\circ C + 220.79\ ^\circ C}\right]$$

$$P = 0.84\ psia$$

To calculate benzene partial pressure:

$$P_{bz} = P\ x_{bz}$$

$$P_{bz} = 0.84\ psia * 0.0063$$

$$P_{bz} = 0.0053\ psia$$

To calculate benzene vapor mole fraction:

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

$$y_{bz} = \frac{0.0053\ psia}{3.64\ psia}$$

$$y_{bz} = 0.0015$$

To calculate benzene vapor weight fraction:

$$Z_{Vbz} = \frac{y_{bz} M_{bz}}{M_V}$$

$$Z_{Vbz} = \frac{0.0015 * 78.11\ lb/lbmol}{68\ lb/lbmol}$$

$$Z_{Vbz} = 0.00167$$

Based on this calculation, the benzene refill losses after a landing would be as follows:

$$L_{FLB} = L_{FL} Z_{Vbz}$$

$$L_{FLB} = 229.9 \frac{lb}{hr} * 0.00167$$

$$L_{FLB} = \ 0.38\ lb/hr$$

Vapor Space Purge Losses for IFR

Proposed permit condition parameters to be used for hourly emission calculations:

- Temperature – For the predicted calculation, either the average of the daily average for the seven day time period prior to the scheduled day for the vapor space purge, based on the past five (5) years of met data or the predicted average temperature for the week the work is anticipated as projected by the National Weather Service. For the actual calculations, the actual temperature of the liquid prior to the purge or ambient average temperature from the days the tank was sitting empty prior to the vapor space purge will be used (whichever is higher). This will be the average of the daily average for the seven (7) day period based on the Albany Weather Station. The use of the seven (7) day time period is based on AP-42 Chapter 7.1.3.8.1(b) that states that it takes nine (9) days for thermal equilibrium to be reached. (Note - The vapors for the vapor space purge would be at the same temperature as the product in the tank that was removed for the cleaning). This temperature is used for T_v in AP-42 Chapter 7 Equation 4-2 and T_{LA} in AP-42 Chapter 7 Equation 1-25.
- Benzene Content – percent liquid by volume to be documented by Certificate of Analysis or a sample taken from the tank representative of the contents. If the tank contains product from multiple product shipments, either a weighted average of the benzene content from each shipment will be calculated based on the volume from each shipment within the tank and the Certificate of Analysis (COA) for each shipment or the maximum benzene from the combined shipments will be used. Alternatively, instead of COA, the benzene content will be based on a sample taken from the tank that is representative of the contents. Benzene content is used for Z_{Lbz} in AP-42 Equation 40-4 (see Section 4 of this document).
- RVP – the Reid Vapor Pressure of the product in the tank from a Certificate of Analysis or from a sample collected from the tank. The RVP determines the A and B constants to be used in the P_{VA} equation (AP-42 Chapter 7 Equation 1-25).
- Destruction Efficiency – for predicted calculations, an efficiency of 98% will be used. For actual calculations, the efficiency documented by the cleaning contractor will be used and is based on reading of the LEL in the inlet to the control device and the outlet VOC concentration.

Supporting Equations for emissions calculations:

AP-42 Chapter 7, Equation 4-2 for Vapor Space Purge Emissions

$$L_P = \frac{P_{VA} V_V M_V S}{R T_V}$$

where:

L_p = VOC vapor space purge loss, lb

P_{VA} = true vapor pressure of the exposed volatile material in the tank, psia (calculated using Equation 1-25, based on average temperature of product in the tank)

V_V = volume of vapor space in ft^3 (see Equation below)

M_V = stock vapor molecular weight (lb/lb-mol)

S = saturation factor (0.5 for IFR with partial liquid heel, 0.6 for IFR with full liquid heel, 0.15 for drain dry)

R = ideal gas constant, 10.731 (psia-ft^3)/(lb-mol-°R)

T_V = the average temperature of the vapor space, °R
= the average ambient temperature, °R

Vapor Space Volume Calculation:

$$V_V = \frac{\pi}{4} D^2 h_v$$

where:

D = tank diameter

h_v = height of vapor space, ft

$$h_v = h_d - h_L$$

where:

h_d = height of deck, ft

h_L = height of liquid, ft

AP-42 Chapter 7, Equation 1-25 (this equation is not for maintenance activities so we would change what temperature we use to Taa)

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

where:

A = constant in the vapor pressure equation, dimensionless

B = constant in the vapor pressure equation, °R

T_{LA} = average daily liquid surface temperature, °R, temperature assumed for this equation will vary based on the type of maintenance activity, as discussed above

Equations to Determine Vapor Pressure Constant A, AP-42 Chapter 7 Figure 7.1-15, Refined Petroleum Stocks

$$A = 15.64 - 1.854\, S^{0.5} - (0.8742 - 0.3280\, S^{0.5}) \ln{(RVP)}$$

Equations to Determine Vapor Pressure Constant B, AP-42 Chapter 7 Figure 7.1-15, Refined Petroleum Stocks

$$B = 8742 - 1042\,S^{0.5} - (1049 - 179.4\,S^{0.5})\ \ln\,(RVP)$$

Equations to Determine Vapor Pressure Constant A, AP-42 Chapter 7 Figure 7.1-16, Crude Oil Stocks

$$A = 12.82 - 0.9672\ \ln\,(RVP)$$

Equations to Determine Vapor Pressure Constant B, AP-42 Chapter 7 Figure 7.1-16, Crude Oil Stocks

$$B = 7261 - 1216\ \ln\,(RVP)$$

Benzene Losses During Vapor Space Purge

$$L_{pBz} = L_p Z_{Vbz}$$

L_{pBz} = Benzene loss during vapor space purge, lb

Z_{Vbz} = weight fraction of benzene in vapor (lb/lb) (see calculation below)

Benzene Vapor Weight Fraction Calculation

Parameters to be used for emission calculations:

- Benzene Content (Z_{Lbz}) – liquid weight fraction of benzene in liquid documented by Certificate of Analysis or sample collection (as outlined in vapor space purge section above)
- Temperature – Depends on situation (as outlined in vapor space purge section above)

Supporting Equations for emissions calculations:

AP-42 Chapter 7, Equation 40-6 (using benzene as the component):

$$Z_{Vbz} = \frac{y_{bz} M_{bz}}{M_V}$$

where:

Z_{Vbz} = vapor weight fraction of benzene (lb/lb)

y_{bz} = vapor mole fraction of benzene, lb-mol/lb-mol

M_{bz} = molecular weight of benzene, lb/lb-mol (78.11 lb/lb-mol)

M_V = molecular weight of vapor stock, lb/lb-mol

AP-42 Chapter 7, Equation 40-5 (using benzene as the component):

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

where:

yi = vapor mole fraction of benzene, lb-mole/lb-mole

P_{bz} = partial pressure of benzene, psia

P_{VA} = true vapor pressure of liquid mixture, psia (see Equation 1-25 in vapor space purge section above)

AP-42, Chapter 7, Equation 40-3 (using benzene as the component):

$$P_{bz} = P\, x_{bz}$$

where:

Pbz = partial pressure of benzene, psia

P = vapor pressure of pure benzene, psia

x_{bz} = liquid mole fraction of benzene, lb-mol/lb-mol

Antoine's equation (temperature will depend on situation)[1]*:*

$$P = (0.019337)10\hat{} \left[A - \frac{B}{T \quad + C}\right]$$

where:

---

[1] See AP-42 Chapter 7, Footnote to Table 7.1-3

A = constant in vapor pressure equation, dimensionless (6.906 for benzene)

B = constant in vapor pressure equation, °C (1211°C for benzene)

C = constant in vapor pressure equation, °C (220.79°C for benzene)

T = temperature depends on situation – see AP-42, °C

AP-42 Chapter 7, Equation 40-4 (using benzene as the component):

$$x_{bz} = \frac{Z_{Lbz} M_L}{M_{bz}}$$

where:

x_{bz} = liquid mole fraction of benzene, lb-mole/lb-mole

Z_{Lbz} = weight fraction of benzene in the liquid, lb/lb

M_L = molecular weight of liquid stock, lb/lb-mol

M_{bz} = molecular weight of benzene, lb/lbmol (78.11 lb/lb-mol)

Vapor Space Purge Example Scenario

Variables are defined as follows for the example IFR vapor space purge for a predicted calculation:

- D (tank diameter): 110 ft
- h_d (height of deck during cleaning): 6 ft
- h_L (height of liquid): 0.25 ft
- RVP: 9
- Mv (stock vapor molecular weight): 68 lb/lbmol
- S (saturation factor, partial heel): 0.5
- A (constant, assuming RVP 9): 11.756
- B (constant, assuming RVP 9): 5315.1°R

The above variables would be used to calculate the VOC emissions from the tank as follows:

Temperature calculation based on daily averages from past 5 years of met data (this is for example purposes only and is not intended to match a specific set of met data):

In this example, the assumption is that the cleaning would occur on July 15, 2023. Assuming that met data would be available for the time period from 2017 through 2021, the following steps would be taken to calculate the temperature:

- The Daily Average for each of the following days in 2017, 2018, 2019, 2020, and 2021 would be determined based on historical met data:
    - July 8
    - July 9
    - July 10
    - July 11
    - July 12
    - July 13
    - July 14
- The average for each date would be calculated based on the 5 year period
- The overall average of the daily averages would be calculated

This example assumes the following daily average temperatures for each date. The average of the daily averages was then calculated, as shown at the bottom of the table. This temperature would then be converted from 73.393°F to 533.1°R.

Date	Average Temperature (°F)
July 8, 2017	69.33
July 9, 2017	70.08
July 10, 2017	73.63
July 11, 2017	74.47
July 12, 2017	75.1
July 13, 2017	67.4
July 14, 2017	65.58
July 8, 2018	72.38
July 9, 2018	76.83
July 10, 2018	76.73
July 11, 2018	74.08
July 12, 2018	72.79
July 13, 2018	76.25
July 14, 2018	78.33
July 8, 2019	71.54
July 9, 2019	74.33
July 10, 2019	76.17
July 11, 2019	77.29
July 12, 2019	74.67
July 13, 2019	76.17
July 14, 2019	77.42
July 8, 2020	77.53
July 9, 2020	80.93
July 10, 2020	79.5
July 11, 2020	79.79
July 12, 2020	80.23

Date	Average Temperature (°F)
July 13, 2020	78.13
July 14, 2020	74.34
July 8, 2021	63.54
July 9, 2021	69.91
July 10, 2021	67.46
July 11, 2021	62.97
July 12, 2021	64.98
July 13, 2021	68.25
July 14, 2021	70.61
AVERAGE	**73.393**

$$P_{VA} = exp\left[A - \frac{B}{T_{LA}}\right]$$

$$P_{VA} = exp\left[11.756 - \frac{5315.1\ °R}{533.1\ °R}\right]$$

$$P_{VA} = 5.965\ psia$$

$$h_v = h_d - h_L$$

$$h_v = 6\ ft - 0.25\ ft$$

$$h_v = 5.75\ ft$$

$$V_V = \frac{\pi}{4} D^2 h_v$$

$$V_V = \frac{\pi}{4}(110\ ft)^2(5.75\ ft)$$

$$V_V = 54{,}644.08\ ft^3$$

$$L_P = \frac{P_{VA} V_V M_V S}{R T_V}$$

$$L_P = \frac{(5.965\ psia)(54644.08\ ft^3)(68\frac{lb}{lbmol})(0.5)}{(10.731\frac{\text{psia}-\text{ft3}}{\text{lb}-\text{mol}-{}^\circ\text{R}})(533.1\ {}^\circ R)}$$

$$L_P = 1937.1\ lbs\ VOCs$$

In this example, the benzene content is based on Certificate of Analyses for two (2) shipments of product. Terminal records indicate the following:

- The product in the tank consists of 60% of Shipment #1 and 40% of Shipment #2
- The benzene content for Shipment #1 is 0.8 volume % or 1.05 weight %
- The benzene content for Shipment #2 is 0.6 volume % or 0.788 weight %

The benzene content would be calculated as follows:

Benzene content of the mixture = Benzene Weight % in Shipment #1 * % of Shipment #1 in tank + Benzene Weight % in Shipment #2 * % of Shipment #2 in tank

Benzene content of the mixture = 1.05 wt% * 0.6 + 0.788 wt% * 0.4 = 0.9452 wt%, or 0.009452 weight fraction

The value of 0.009452 would then be used as the Z_{Lbz} (liquid weight fraction variable) for the calculations, as follows, given that molecular weight of benzene is 78.11 lb/lbmol:

To calculate liquid mole fraction of benzene:

$$x_{bz} = \frac{Z_{Lbz} M_L}{M_{bz}}$$

$$x_{bz} = \frac{0.009452 * 92\ lb/lbmol}{78.11\frac{lb}{lbmol}}$$

$$x_{bz} = 0.0111$$

To calculate benzene vapor pressure:

$$P = (0.019337)10\hat{}\left[A - \frac{B}{T + C}\right]$$

$$P = (0.019337)10^\wedge\left[6.906 - \frac{1211\,℃}{23\,℃ + 220.79\,℃}\right]$$

$$P = 1.68\,psia$$

To calculate benzene partial pressure:

$$P_{bz} = P\,x_{bz}$$

$$P_{bz} = 1.68\,psia * 0.0111$$

$$P_{bz} = 0.0186\,psia$$

To calculate benzene vapor mole fraction:

$$y_{bz} = \frac{P_{bz}}{P_{VA}}$$

$$y_{bz} = \frac{0.0186\,psia}{5.965\,psia}$$

$$y_{bz} = 0.00312$$

To calculate benzene vapor weight fraction:

$$Z_{Vbz} = \frac{y_{bz}M_{bz}}{M_V}$$

$$Z_{Vbz} = \frac{0.00312 * 78.11\,lb/lbmol}{68\,lb/lbmol}$$

$$Z_{Vbz} = 0.00359$$

Using the above calculations, the benzene vapor space purge loss would be as follows:

$$L_{pB} = L_p Z_{Vbz}$$

$$L_{pB} = 1937.1\ lbs\ VOCs * 0.00359$$

$$L_{pB} = 6.95\ lbs$$

Assuming a destruction efficiency of 98%, a value of 0.139 lbs of benzene (2% of L_{pB} above) would assumed to be emitted during vapor space purge for use in the air dispersion model.

Attachment XVIII

Sampling Protocols

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ENGINEERING, PLLC

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SAMPLING PROTOCOL

Samples will be collected by qualified personnel in accordance with recognized methods established by industry standards such as API MPMS Chapter 8 or referenced method. Sampling methods will be as outlined below. Alternative sample methods may be used upon approval by NYSDEC.

Crude Hydrogen Sulfide Sampling

Samples will be collected from tanks storing crude oil and analyzed for hydrogen sulfide vapor concentration per ASTM D5705 MOD or ITM 3468.

Samples will be collected once per month unless no new product has been received into the tank since the last sample. Once additional product is received, a new sample will be collected. The ratio method outlined in this protocol may be used.

Vapor Pressure Sampling

Samples will be collected from tanks storing gasoline, crude oil, and blendstock/component and analyzed for vapor pressure. Crude vapor pressure will be analyzed per ASTM D6377. Gasoline and Blendstock/component vapor pressure will be analyzed by ASTM D5191. The sampling methods apply to both Reid Vapor Pressure (RVP) and True Vapor Pressure (TVP). Vapor pressure may be determined from the certificate of analysis (COA) rather than through sampling.

Samples will be collected once per month for blendstock/component and crude oil unless no new product has been received into the tank since the last sample. Once additional product is received, a new sample will be collected. The ratio method outlined in this protocol may be used. The vapor pressure may be determined from the COA rather than through sampling.

Samples will be collected once per month during summer RVP season for gasoline unless no new product has been received into the tank since the last sample. Once additional product is received, a new sample will be collected. The ratio method outlined in this protocol may be used. The vapor pressure may be determined from the COA rather than through sampling. The higher of the COAs may be used for the entire tank contents.

If the COA shows vapor pressure for all product in the tanks is lower than the limits specified in the permit, no sampling is required.

When the local maximum monthly average temperature exceeds 75 degree F, as reported by the National Weather Service, a TVP sample will be collected from crude, blendstock/component tanks to ensure TVP is less than 76.6 kPa (11.1 psia). A sample will only be collected if the RVP on the COA for the product in the tank (or any COA if there is a mixture of products) is greater than 11 psi. The TVP will be analyzed at the monthly average temperature reported by the National Weather Service.

Benzene Sampling

Samples will be collected from tanks storing gasoline, crude oil, and blendstock/component and analyzed for benzene per ASTM D3606 for gasoline and blendstock/component and per ASTM D6730 MOD for crude oil. The benzene content may also be determined from the COA rather than through sampling. The COA will be reported in volume percent and converted to weight percent as determined below. When sampling is conducted, results will be reported in weight percent.

Samples will be collected once per month unless no new product has been received into the tank since the last sample. Once additional product is received, a new sample will be collected. The ratio method outlined in this protocol may be used. The benzene content may be determined from the certificate of analysis (COA) rather than through sampling. The higher of the COAs may be used for the entire tank contents.

If the COA shows benzene for all product in the tanks is lower than the limits specified in the permit, no sampling is required.

Benzene Conversion from Volume % to Weight %

In this example, the benzene content is based on a COA for gasoline.

wt%=vol%*(density of benzene/density of the product)
wt%=0.8%*(7.32 lb/gal / 5.6 lb/gal)
wt%= 1.05 wt% benzene

Ratio Method

Samples will be collected two times to confirm accuracy of the ratio method. Once accuracy is approved by NYSDEC, no additional samples will be required unless requested by NYSDEC. The ratio method is accurate if it is within 10% of the measured value. If accuracy is not within 10% the ratio method will be revised as necessary.

The ratio method uses the volume of product from multiple shipments into the tank and the corresponding COA to calculate the parameter as outlined below.

Example: Determining Benzene Content for a Mixture

In this example, the benzene content is based on the COA for two (2) shipments of product.

Terminal records indicate the following:

- The product in the tank consists of 60% of Shipment #1 and 40% of Shipment #2
- The benzene content for Shipment #1 is 0.8 volume % or 1.05 weight %
- The benzene content for Shipment #2 is 0.6 volume % or 0.788 weight %

The benzene content would be calculated as follows:

Benzene content of the mixture = Benzene Volume/Weight % in Shipment #1 * % of Shipment #1 in tank + Benzene Volume/Weight % in Shipment #2 * % of Shipment #2 in tank

Benzene content of the mixture = 1.05 wt% * 0.6 + 0.788 wt% * 0.4 = 0.9452 wt% benzene

Example: Determining RVP for a Mixture

In this example, the RVP is based on the COA for two (2) shipments of product.

Terminal records indicate the following:

- The product in the tank consists of 60% of Shipment #1 and 40% of Shipment #2
- The RVP of Shipment #1 is 13 psi.
- The RVP of Shipment #2 is 9 psi.

The RVP would be calculated as follows:

RVP of the mixture = (Shipment 1 $\text{RVP}^{1.25}$* % of Shipment #1 in tank + Shipment 2 $\text{RVP}^{1.25}$ * % of Shipment #2 in tank)$^{1/1.25}$

RVP of the mixture = ($13^{1.25}$ psi * 0.6 + $8^{1.25}$ psi * 0.4)$^{1/1.25}$ = 11.1 psi

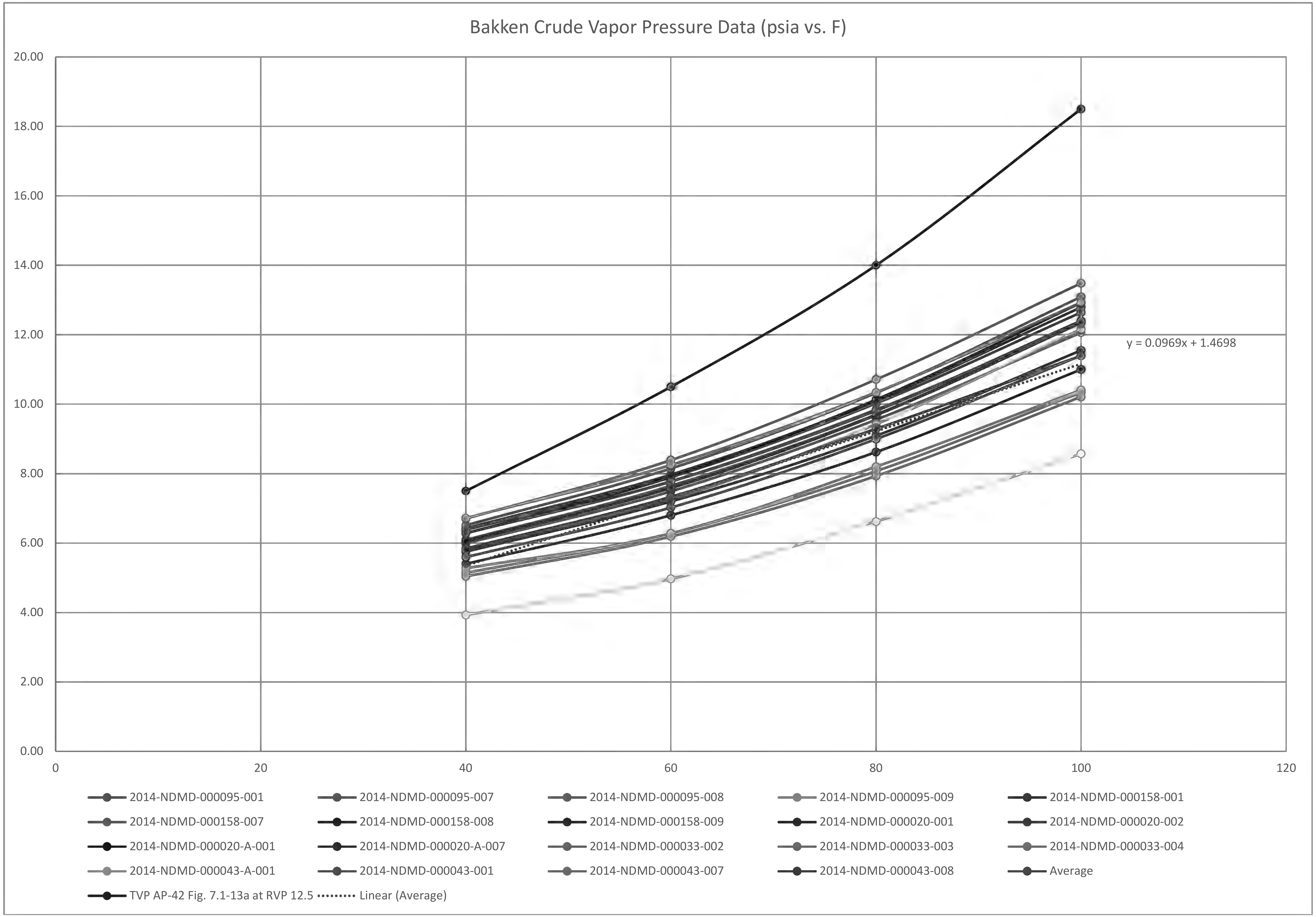
The RVP in the example was calculated based on the formulas below. RVP blending indices were used because RVP is not an additive property.

$$\text{BI}_{\text{RVP}i} = \text{RVP}_i^{1.25}$$

$$\text{BI}_{\text{RVP,Blend}} = \sum_{i=1}^{n} x_{vi}\text{BI}_{\text{RVP}i}$$

Attachment XIX

Crude Vapor Pressure Graphs


Bakken Crude Vapor Pressure Data (psia vs. F)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0
20
40
60
80
100
120
y = 0.0969x + 1.4698
2014-NDMD-000095-001
2014-NDMD-000095-007
2014-NDMD-000095-008
2014-NDMD-000095-009
2014-NDMD-000158-001
2014-NDMD-000158-007
2014-NDMD-000158-008
2014-NDMD-000158-009
2014-NDMD-000020-001
2014-NDMD-000020-002
2014-NDMD-000020-A-001
2014-NDMD-000020-A-007
2014-NDMD-000033-002
2014-NDMD-000033-003
2014-NDMD-000033-004
2014-NDMD-000043-A-001
2014-NDMD-000043-001
2014-NDMD-000043-007
2014-NDMD-000043-008
Average
TVP AP-42 Fig. 7.1-13a at RVP 12.5
Linear (Average)

Attachment XX

Crude H2S Sampling Results

Report of Analysis

Client: **Global Companies, LLC**
Job Location: Global Petroleum - Stampede
Our Reference Number: US01155-0000073

Client Reference Number:
None

Sample ID: 2014-NDMD-000072-001
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global
Representing: Stampede Terminal - Tank 01 Running

Date Taken: 12-March-2014
Date Submitted: 12-March-2014
Date Tested: 17-March-2014
Drawn By: Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.18	Vol %
	Toluene	0.42	Vol %
	Ethylbenzene	0.34	Vol %
	Xylenes	0.99	Vol %

Sample ID: 2014-NDMD-000072-002
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global
Representing: Stampede Terminal - Tank 02 Running

Date Taken: 12-March-2014
Date Submitted: 12-March-2014
Date Tested: 17-March-2014
Drawn By: Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.18	Vol %
	Toluene	0.42	Vol %
	Ethylbenzene	0.31	Vol %
	Xylenes	0.93	Vol %

Sample ID: 2014-NDMD-000072-003
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global
Representing: Beulah Terminal - Tank 01 Running

Date Taken: 12-March-2014
Date Submitted: 12-March-2014
Date Tested: 17-March-2014
Drawn By: Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.21	Vol %
	Toluene	0.38	Vol %

Report of Analysis

Sample ID:	2014-NDMD-000072-003	**Date Taken:**	12-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	12-March-2014
Vessel/Location:	Global	**Date Tested:**	17-March-2014
Representing:	Beulah Terminal - Tank 01 Running	**Drawn By:**	Intertek

Method	Test	Result	Units
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Ethylbenzene	0.22	Vol %
	Xylenes	1.01	Vol %

Sample ID:	2014-NDMD-000072-004	**Date Taken:**	12-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	12-March-2014
Vessel/Location:	Global	**Date Tested:**	17-March-2014
Representing:	Beulah Terminal - Tank 02 Running	**Drawn By:**	Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %
	Toluene	0.36	Vol %
	Ethylbenzene	0.21	Vol %
	Xylenes	0.96	Vol %

This final report has been reviewed for accuracy, completeness, and comparison against specifications when available. The reported results are only representative of the samples submitted for testing. This report shall not be reproduced except in full without written approval of the laboratory.

Signed: ______________________ Date: ______________________

Intertek
Jordan Reinbold, Laboratory Technician

Report of Analysis

Client:	**Global Companies, LLC**	**Client Reference Number:**	
Job Location:	Global Petroleum - Stampede	None	
Our Reference Number:	US01155-0000080		

Sample ID:	2014-NDMD-000082-001	**Date Taken:**	19-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	19-March-2014
Vessel/Location:	Global	**Date Tested:**	25-March-2014
Representing:	Stampede Tank 01 Running	**Drawn By:**	Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	8	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.18	Vol %
	Toluene	0.45	Vol %
	Ethylbenzene	0.35	Vol %
	Xylenes	1.00	Vol %

Sample ID:	2014-NDMD-000082-002	**Date Taken:**	19-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	19-March-2014
Vessel/Location:	Global	**Date Tested:**	25-March-2014
Representing:	Stampede Tank 02 Running	**Drawn By:**	Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.18	Vol %
	Toluene	0.41	Vol %
	Ethylbenzene	0.30	Vol %
	Xylenes	0.92	Vol %

Sample ID:	2014-NDMD-000082-003	**Date Taken:**	19-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	19-March-2014
Vessel/Location:	Global	**Date Tested:**	25-March-2014
Representing:	Beulah Tank 01 Running	**Drawn By:**	Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.21	Vol %
	Toluene	0.38	Vol %

Report of Analysis

Sample ID:	2014-NDMD-000082-003	**Date Taken:**	19-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	19-March-2014
Vessel/Location:	Global	**Date Tested:**	25-March-2014
Representing:	Beulah Tank 01 Running	**Drawn By:**	Intertek

Method	**Test**	**Result**	**Units**
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Ethylbenzene	0.23	Vol %
	Xylenes	0.96	Vol %

Sample ID:	2014-NDMD-000082-004	**Date Taken:**	19-March-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	19-March-2014
Vessel/Location:	Global	**Date Tested:**	25-March-2014
Representing:	Beulah Tank 02 Running	**Drawn By:**	Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %
	Toluene	0.36	Vol %
	Ethylbenzene	0.21	Vol %
	Xylenes	0.95	Vol %

This final report has been reviewed for accuracy, completeness, and comparison against specifications when available. The reported results are only representative of the samples submitted for testing. This report shall not be reproduced except in full without written approval of the laboratory.

Signed: ______________________________ Date: ______________________

Intertek
Jordan Reinbold, Laboratory Technician

Report of Analysis

Client: Global Companies, LLC
Job Location:
Our Reference Number: US01155-0000102

Client Reference Number:
None

Sample ID: 2014-NDMD-000103-001
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global ND
Representing: Stampede Tank 1 Submitted Sample

Date Taken: 01-April-2014
Date Submitted: 01-April-2014
Date Tested: 04-April-2014
Drawn By: Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.18	Vol %

Sample ID: 2014-NDMD-000103-002
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global ND
Representing: Stampede Tank 2 Submitted Sample

Date Taken: 01-April-2014
Date Submitted: 01-April-2014
Date Tested: 04-April-2014
Drawn By: Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %

Sample ID: 2014-NDMD-000103-003
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global ND
Representing: Beulah Tank 1 Submitted Sample

Date Taken: 01-April-2014
Date Submitted: 01-April-2014
Date Tested: 04-April-2014
Drawn By: Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	2	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %

Sample ID: 2014-NDMD-000103-004
Sample Designated As: Bakken Crude Oil
Vessel/Location: Global ND
Representing: Beulah Tank 2 Submitted Sample

Date Taken: 01-April-2014
Date Submitted: 01-April-2014
Date Tested: 04-April-2014
Drawn By: Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F

Report of Analysis

Sample ID:	2014-NDMD-000103-004	**Date Taken:**	01-April-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	01-April-2014
Vessel/Location:	Global ND	**Date Tested:**	04-April-2014
Representing:	Beulah Tank 2 Submitted Sample	**Drawn By:**	Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %

This final report has been reviewed for accuracy, completeness, and comparison against specifications when available. The reported results are only representative of the samples submitted for testing. This report shall not be reproduced except in full without written approval of the laboratory.

Signed: ____________________ Date: ____________________

Intertek
Jordan Reinbold, Laboratory Technician

Intertek

Report of Analysis

Client:	**Global Companies, LLC**	**Client Reference Number:**	
Job Location:		None	
Our Reference Number:	US01155-0000114		

Sample ID:	2014-NDMD-000116-001	**Date Taken:**	09-April-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	09-April-2014
Vessel/Location:	Other	**Date Tested:**	14-April-2014
Representing:	Stampede Tank 01 Running	**Drawn By:**	Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.19	Vol %

Sample ID:	2014-NDMD-000116-002	**Date Taken:**	09-April-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	09-April-2014
Vessel/Location:	Other	**Date Tested:**	14-April-2014
Representing:	Stampede Tank 02 Running	**Drawn By:**	Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.18	Vol %

Sample ID:	2014-NDMD-000116-003	**Date Taken:**	09-April-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	09-April-2014
Vessel/Location:	Other	**Date Tested:**	14-April-2014
Representing:	Beulah Tank 01 Running	**Drawn By:**	Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %

Sample ID:	2014-NDMD-000116-004	**Date Taken:**	09-April-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	09-April-2014
Vessel/Location:	Other	**Date Tested:**	14-April-2014
Representing:	Beulah Tank 02 Running	**Drawn By:**	Intertek

Method	**Test**	**Result**	**Units**
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Test temperature	77	F

Report of Analysis

Sample ID:	2014-NDMD-000116-004	**Date Taken:**	09-April-2014
Sample Designated As:	Bakken Crude Oil	**Date Submitted:**	09-April-2014
Vessel/Location:	Other	**Date Tested:**	14-April-2014
Representing:	Beulah Tank 02 Running	**Drawn By:**	Intertek

Method	Test	Result	Units
ITM 3468	Determination of Hydrogen Sulfide in Vapor Phase of Volatile Samples		
	Hydrogen Sulfide in vapor phase	< 1	ppm v/v
ASTM D6730 MOD	Determination of Light Ends in Crude Oil by Direct Injection Gas Chromatography		
	Benzene	0.20	Vol %

Signed: ______________________ Date: ______________________

Intertek
Jordan Reinbold, Laboratory Technician

Attachment XXI

VCU Performance Letter

JOHN ZINK HAMWORTHY
COMBUSTION

John Zink Company LLC
11920 East Apache Street
Tulsa, Oklahoma 74116
United States

T : +1.918.234.1800
F : +1.918.234.2700

March 21st, 2023

Attention: Gianna Aiezza, on behalf of Global Partners, LP

Reference: John Zink VCU SO Numbers AO03051, 9103822, 9125497

Subject: VCU Performance

Dear Gianna,

Below is a summary of three John Zink Vapor Combustion Units at Global Partners Albany Site. John Zink has evaluated the designs for updated emissions requirements. The below updated emissions are what John Zink would expect for equipment functioning correctly with no faults. The VCUs will require air source testing by others to confirm emissions at the estimated operating temperatures. **The loading rates allowed to meet these emissions may be different than the originally listed loading rates.**

AO03051 VCURR

Stack Size: 8' OD x 35' OAH
Application: Railcar Loading
Product: Gasoline, Ethanol
Vapor Composition: 60% as Propane Maximum
Liquid Loading Rate: **2,500 GPM**

Updated Minimum Operating Temperature: **1400° F**
Updated Emissions Limit: 2 mg of hydrocarbon per Liter of product loaded
Updated Fuel Gas Consumption: 0-175 SCFM

9103822 VCUM1

Stack Size: 6' OD x 35' OAH
Application: Marine Loading
Product: Ethanol, Gasoline, Crude, Blend Stock
Vapor Composition: Varies By Product
Liquid Loading Rate:
  Ethanol (3.5 PSI TVP): 4,000 bbl/hr
  Gasoline (12.5 PSI TVP): 2,200 bbl/hr
  Crude Oil (12.5 PSI TVP): 2,200 bbl/hr
  Blend Stock (15 PSI TVP): 1,500 bbl/hr

Updated Minimum Operating Temperature: 1000° F
Updated Emissions Limit: 10 mg of hydrocarbon per Liter of product loaded
Updated Fuel Gas Consumption: 0-60 SCFM

9125497 VCUM2

Stack Size:	10’ OD x 60’ OAH
Application:	Marine Loading
Product:	Ethanol, Gasoline, Crude, Blend Stock
Vapor Composition:	Varies By Product
Liquid Loading Rate:	
Ethanol (3.5 PSI TVP):	15,000 bbl/hr
Gasoline (12.5 PSI TVP):	**7,000 bbl/hr**
Crude Oil (12.5 PSI TVP):	**7,000 bbl/hr**
Blend Stock (15 PSI TVP):	**5,300 bbl/hr**
Updated Minimum Operating Temperature:	**1400° F**
Updated Emissions Limit:	2 mg of hydrocarbon per Liter of product loaded
Updated Fuel Gas Consumption:	0-400 SCFM

NOTE: Fuel Gas does not include Enrichment Gas at Dock.

This estimate assumes that the units are in proper working condition and are operating as intended. This estimate assumes a maximum True Vapor Pressure of 3.5 PSI for ethanol, 12.5 PSI for Gasoline, 12.5 PSI for Crude Oil, and 15 PSI for Blend Stock.

Respectfully,

Benjamin Bolin

Benjamin Bolin
John Zink Company, LLC

Attachment XXII

John Zink CEMS Limit

JOHN ZINK®
A KOCH-INDUSTRIES COMPANY

International Headquarters
P.O. Box 21220
Tulsa, Oklahoma 74121-1220
Tel: 918/234-1800

Harold Dinsmore
Vice President
Vapor Control Systems
Tel: 918-234-2914
Fax: 918-234-1968
Email: dinsmorh@kochind.com

December 6, 1998

Subject: Continuous Emission Monitors For Carbon Adsorption Based Vapor Recovery Systems

Dear Customer:

This is in response to requests for a recommendation as to the proper alarm settings for continuous emission monitors (CEMs) used on carbon adsorption based gasoline vapor recovery systems. Specifically, we have been requested to specify maximum total hydrocarbon concentration values that will assure compliance with regulatory volatile organic compound (VOC) emission standards.

In the United States and in other countries which have adopted the U.S. standards, emission standards for gasoline bulk distribution terminals are expressed as an allowable weight of VOC which can be emitted per unit volume of gasoline loaded. The current U.S. Federal standards are either 10 or 35 milligrams of VOC per liter of gasoline loaded averaged over a 6 hour continuous testing period. While standards expressed in these units of measurement are good ones in that they directly relate VOC emissions to truck rack loading activity, nevertheless, they do require a relatively complex test procedure involving collection of multiple data to determine compliance.

The required test procedure is described in the U.S. Code of Federal Regulations, Title 40, Part 60, Subpart XX. The test procedure requires a determination of the mass of VOCs vented from the VRU during each 5 minute interval over a 6 hour test period. To do this calculation, it is necessary to measure, for each 5 minute interval during the test, the total hydrocarbon concentration of the VRU vent expressed as volume percent, the total actual volume of vented air/hydrocarbon vapor, the vent pressure at the vent volume measuring meter, and the vent temperature at the vent volume measuring meter. This data, with the proper conversion factors, enables the weight of hydrocarbon vapor vented from the VRU during each 5 minute interval to be calculated. The total weight of hydrocarbon vented from the VRU during the 6 hour test period is the sum of the weight of hydrocarbon vented during each 5 minute interval. Compliance with the Federal emission standard is then determined by dividing the sum of the weight of hydrocarbon vented during each 5 minute interval by the total volume of gasoline loaded during the 6 hour test period. Because of the expense and complexity of this type of testing, U.S. regulatory agencies require compliance testing on only an infrequent basis, with none requiring testing more frequently than once per year.

In an effort to discover a means whereby the operation of the VRU can be relatively easily and continuously monitored to ascertain whether or not it is operating within compliance of the required emission standard, some regulatory agencies have required that a continuous emission monitor be provided with the unit to continuously measure hydrocarbon concentration in the air stream vented from the VRU. These continuous emission monitors are normally non dispersive infrared based analyzers which read total hydrocarbon concentration in volume % expressed as propane or butane equivalents. However, since there is no direct correlation relating vent hydrocarbon concentration to the weight of hydrocarbon vapor emitted from the VRU, this data by itself, can only be used as a guideline. As discussed above, it is necessary to not only know the concentration of hydrocarbon vented from the VRU, it is also required to know the corresponding volume, measured at standard conditions, of the vent stream to determine the weight of hydrocarbon vapor emitted. Without equipment to measure vent stream volume corrected to standard conditions, it is necessary to make several assumptions to correlate hydrocarbon vent stream concentration to the weight of total hydrocarbon vapor vented during the test period.

There are several variables that determine the volume of the vent stream from the VRU. The major variable that influences the volume of air vented from the VRU is the inlet hydrocarbon concentration which typically varies between 10 and 60 volume %. For example, higher inlet hydrocarbon concentrations mean lower air content of the inlet air+vapor stream which results in lower vented air volume from the VRU. Conversely, lower inlet hydrocarbon concentrations result in higher air volume vented from the VRU. The temperature and pressure of the gasoline transport being loaded also affects the standard volume of air vented from the VRU. For example, at higher pressures and lower temperatures, a higher standard volume of air is displaced from the gasoline transport while being loaded than when the transport is being loaded at lower pressures and higher temperatures.. Another variable affecting the volume of air vented from the VRU is determined by the volume of outside air introduced into the VRU during adsorber repressurization and the amount of purge air introduced into the VRU during the carbon bed regeneration process. The air vented from the VRU includes air from not only the inlet vapor stream, but also, this repressurization and purge air as well. The total volume of repressurization and purge air typically is about 15 to 35% of the inlet air+vapor volume. Finally, a variable having an influence on the amount of air vented from the VRU is the vapor growth factor. This factor is expressed as a ratio of the volume of air+hydrocarbon vapor displaced from the transport vehicle divided by the volume of gasoline loaded during the loading operation. Typically, vapor growth factors range from 1.0 to 1.2.

The attached Tables Numbers 1 and 2 lists the allowable vent stream hydrocarbon concentration without exceeding the VOC emission standards using different combinations of those variables discussed above. Table Number 1 provides data for an emission standard of 10 milligrams of VOC per liter of gasoline loaded while Table Number 2 provides data for an emission standard of 35 milligrams per liter. For each emission standard, allowable vent hydrocarbon concentrations were calculated for 9 cases involving varying combinations of operating variables which are likely to be encountered in gasoline bulk distribution terminals. It is obvious from an analysis of this table that for the conditions evaluated, the maximum allowable vent hydrocarbon concentration can vary from approx. 0.4 to 1.1 vol. % for the 10 mg/l standard and from approx. 1.3 to 3.7 vol. % without exceeding the 35 mg/l emission standard.

Based on an analysis of the attached data, it can be concluded that a continuous vent analyzer can be used as a rough guideline to ascertain whether the VRU is operating in compliance with the emission standard, however, it should not be used as an absolute measure to determine compliance because of the influence of several other operating variables. However, if regulatory agencies insist on a requirement that vent analyzer total hydrocarbon concentration values, alone, be used as a means of judging compliance with the emission standards, then it is very important that the maximum allowable hydrocarbon vent concentration be set high enough so as not to impose a more stringent standard than is actually required. It also is important to average the analyzer readings over a sufficient period since the emission standards allow for averaging of results over several hours. **In this event, it is John Zink's recommendation that the maximum allowable vent total hydrocarbon concentrations be set no lower than 1.1 vol. % and 3.7 vol. %, measured as propane equivalent, for the two emission standards of 10 mg/l and 35 mg/l respectively. Further, it is our recommendation that the allowable vent hydrocarbon emission concentration be averaged over at least a one hour period.** In addition, an allowance should be made for the exclusion of methane or ethane should these compounds be detected in the VRU vent stream. Because these compounds are not normally present in gasoline vapor, this is generally not an issue. However, on a few occasions, because of the practice of storing gasoline in tanks blanketed with natural or refinery fuel gas, it can be an issue and the proper allowances must be taken because the recovery of these compounds is not required by the emission standard and is not included as part of John Zink's performance guarantee.

Sincerely,

Harold Dinsmore
Vice President
Vapor Control Systems Group
John Zink Company

Attachments
"cemsalm1"

TABLE NUMBER 1

MAX ALLOWABLE ADAB VRU VENT TOTAL HYDROCARBON CONCENTRATION, VOLUME % AS PROPANE
AT VOC EMISSION STANDARD OF 10 MILLIGRAMS PER LITER OF GASOLINE LOADED

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9
OPERATING VARIABLES									
Emission Standard, mg/l	10	10	10	10	10	10	10	10	10
Temp Of Inlet Vapor, Degree F.	100	60	20	100	20	60	60	100	100
Press Of Inlet Vapor, "HgA	31	31	30	31	29	31	29	31	29
Repress/Purge Air Factor	0.35	0.35	0.15	0.25	0.15	0.15	0.15	0.15	0.15
Vapor Growth Factor	1.2	1.1	1.2	1	1	1	1	1	1

VRU Inlet Hydrocarbon Concentration Vol%	MAX VENT HYDROCARBON CONCENTRATION VOLUME % AS PROPANE								
	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9
10	0.370	0.375	0.390	0.482	0.484	0.491	0.524	0.528	0.564
15	0.386	0.391	0.410	0.504	0.508	0.515	0.550	0.554	0.592
20	0.402	0.408	0.431	0.528	0.535	0.542	0.579	0.583	0.623
25	0.421	0.426	0.455	0.554	0.564	0.572	0.611	0.616	0.658
30	0.441	0.446	0.482	0.583	0.597	0.605	0.647	0.652	0.696
35	0.462	0.468	0.512	0.616	0.635	0.643	0.687	0.692	0.739
40	0.487	0.493	0.546	0.652	0.677	0.686	0.733	0.738	0.788
45	0.514	0.520	0.584	0.692	0.725	0.734	0.784	0.790	0.844
50	0.544	0.551	0.629	0.738	0.780	0.790	0.844	0.850	0.909
55	0.577	0.585	0.681	0.790	0.844	0.855	0.914	0.921	0.984
60	0.616	0.624	0.743	0.850	0.920	0.933	0.996	1.004	1.072

A ratio can be used to get the maximum vent hydrocarbon concentration when the emission standard is 2 mg/l, assuming the operating variables from each case and VRU inlet hydrocarbon concentration are the same.
Example using case 8 and 60 vol% VRU inlet hydrocarbon concentration.
If 10 mg/l = 1.004 vol% as propane,
then 2 mg/l = 0.20 vol% as propane

Sample Calculation
Correlating Allowable VRU Vent Hydrocarbon Concentration
Not To Exceed VOC Emission Standard Of 10 Milligrams Per Liter Of Product Loaded

Case Number 4, Table Number 1 @ 40% Inlet Hydrocarbon Vapor Contentration:

VOC Emission Standard: 10 milligrams of VOC per liter of product loaded.

Operating Conditions:

Temp. of inlet vapor: 100 °F = 560 °R
Pressure of inlet vapor: 31 "HgA
Inlet vapor hydrocarbon conc: 40 vol% actual concentration
Repressurization/Purge Air Factor: 0.25
Vapor Growth Factor: 1.0

Calculations:

Basis: 1000 gallon of liquid gasoline loaded.

Gasoline Loaded:
= 1000 gallons (3.785 liters / gallon) = 3785 liters

Standard vapor flow volume to VRU from truck rack:
= (1000 gallons) (1 cubic foot / 7.48 gallons) (520°R / 560°R) (31 "HgA / 29.92 "HgA) (1.0) = 128.62 standard cubic feet

Air to VRU from truck rack:
= (128.62 scf) (1-0.4) = 77.17 scf

Air in VRU vent = Air from truck rack + (repressurization air and purge air)
= 77.17 scf + (repressurization and purge air factor) (128.62)
= 77.17 + (0.25) (128.62) = 109.32 scf

Maximum allowable hydrocarbon vapor emissions from VRU:
= (10 milligrams / liter) (3785 liters)
= 37850 milligrams of hydrocarbon vapor

= (37850 mg) (1 pound / 453592 mg) (1 lb. mole / 44.1 lb.) (379 scf/ lb. mole)
= 0.717 scf of hydrocarbon vapor measured as propane equivalent

Maximum allowable VRU vent concentration of hydrocarbon vapor:
= [scf of hydrocarbon / (scf of hydrocarbon + scf of air)] (100)
= [0.717 / (0.717 + 109.32)] (100)
= **0.652 vol. % as propane equivalent**

Attachment XXIII

Kb Tank Table

Global Albany
Kb Summary

Tank		Kb	Date
TK031	4,200,000 gallon tank	Yes	2010 - tank permitted for ethanol
TK032	4,200,000 gallon tank	Yes	2010 - tank permitted for ethanol
TK039	4,200,000 gallon tank	Yes	2009 - tank permitted for gasoline
TK114	3,887,898 gallon tank	Yes	2009 - IFR installed
TK115	5,851,902 gallon tank	Yes	2009 - IFR installed
TK117	3,028,032 gallon tank	No	
TK118	2,426,550 gallon tank	No	
TK119	1,619,268 gallon tank	No	
TK120	1,640,940 gallon tank	No	
TK121	5,370,204 gallon tank	No	

Attachment XXIV

Biodiesel SDS

SAFETY DATA SHEET
B99

1. IDENTIFICATION

Product Identifier	B99
Synonyms:	B99.9; Biofuel, Biodiesel, Methyl Esters
Intended use of the product:	Fuel or Fuel Additive
Contact:	Global Companies LLC Water Mill Center 800 South St. Waltham, MA 02454-9161 www.globalp.com
Contact Information:	EMERGENCY TELEPHONE NUMBER (24 hrs): CHEMTREC (800) 424-9300 COMPANY CONTACT (business hours): 800-542-0778

2. HAZARD IDENTIFICATION

According to OSHA 29 CFR 1910.1200 HCS

Classification of the Substance or Mixture

Classification (GHS-US):
Not Classified

Labeling Elements

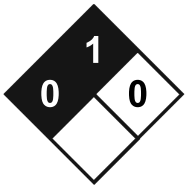
None

Signal Word (GHS-US) : No signal word
Hazard Statements (GHS-US) : Not classified as a health hazard.

Precautionary Statements (GHS-US) : Not applicable.

Other information:

NFPA 704
Health: 0
Fire: 1
Reactivity: 0



3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Composition Information

This material is a complex mixture of methyl esters derived from the processing of tallow, animal fat and/or vegetable oil.

Name	Product Identifier (CAS#)	% (w/w)	Classification
Methyl Esters	Various	>99	None
Distillate	Various	<1	None

Additional Formulation Information
Also see Section 15 for list of SARA Section 313 toxic chemicals.

4. FIRST AID MEASURES

Route	Measures
Inhalation	Remove person to fresh air.
Ingestion	DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.
Eye Contact	If present, remove contact lenses. In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 minutes. Hold eyelids open to ensure adequate flushing. Seek medical attention.
Skin Contact	Remove contaminated clothing and shoes. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.
Absorption	As with skin contact, remove contaminated clothing and flush with copious amounts of water. Flush affected area for at least 15 minutes to minimize potential for further absorption.

Most Important Symptoms
Contact may cause eye, skin and mucous membrane irritation.

Medical Conditions Aggravated by Exposure
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

5. FIRE-FIGHTING MEASURES

Extinguishing Media
Foam, carbon dioxide, dry chemical are most suitable

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, C02, water spray, firefighting foam, or Halon. Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment.

LARGE FIRES: Water spray, fog or firefighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific Hazards / Products of Combustion
Combustion may produce smoke, carbon monoxide and other products of incomplete combustion.

Special Precautions and Protective Equipment for Firefighters
Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

Fighting Equipment/Instructions
Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH- approved pressure-demand self-contained breathing apparatus with full face piece and protective clothing.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions

ACTIVATE FACILITY SPCC, SPILL CONTINGENCY or EMERGENCY PLAN.

Depending on the size of the spill, downwind receptors may need to be notified.

Evacuate nonessential personnel and remove or secure all ignition sources (flame, spark, hot work, hot metal, etc.). Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Do not touch or walk-through spilled material.

Use appropriate personal protective equipment to prevent eye/skin contact and absorption. Use NIOSH approved respiratory protection, if warranted, to prevent exposures above permissible limits (see Section 8). Contaminated clothing should not be near sources of ignition.

Environmental Precautions

Stop the spill to prevent environmental release if it can be done safely. Take action to isolate environmental receptors including drains, storm sewers and natural water bodies. Keep on impervious surface if at all possible. Use water sparingly to prevent product from spreading. Foam and absorbents may be used to reduce / prevent airborne release.

Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Follow federal, state or local requirements for reporting environmental release where necessary (see Section 15 for further information)

Containment and Clean-Up Methods

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with dry earth, sand or other non-combustible, inert oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container with clean, non-sparking tools for reclamation or disposal. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING AND STORAGE

Handling Precautions

USE ONLY AS A FUEL
DO NOT SIPHON BY MOUTH

Use good personal hygiene practices. Use only with protective equipment specified in Section 8. Avoid repeated and/or prolonged skin exposure. Use only outdoors or in well ventilated areas. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Consider the need to discard contaminated leather shoes and gloves. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Storage

Use approved vented containers. Keep containers closed and clearly labeled. Label all secondary containers that this material is transferred into with the chemical name and associated hazard(s). Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Separate from incompatible materials (see Section 10) by distance or secondary containment.

Store in a well-ventilated area. Protect containers from damage and vehicular traffic. Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 “Cleaning Mobile Tanks In Flammable and Combustible Liquid Service” and API RP 2015 “Cleaning Petroleum Storage Tanks”.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits

Component	CAS #	List	Value
Methyl Esters	Various	OSHA PEL TWA (Oil Mist Standard)	5 mg/m3
Distillate	Various	OSHA PEL TWA (Oil Mist Standard)	5 mg/m3

Engineering Controls

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure limits.

Emergency shower and eyewash should be provided in proximity to handling areas in the event of exposure to decontaminate.

Personal Protective Equipment

Exposure	Equipment
Eye / Face	Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.
Skin	Gloves constructed of nitrile or neoprene are recommended when handling this material. If contact with the body is expected, chemical protective clothing such as of E.I. DuPont Tychem ®, Barricade®, or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.
Respiratory	A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.
Thermal	Product is stored at ambient temperature. No thermal protection is required except for emergency operations involving actual or potential for fire.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Value	Comments
Appearance	A clear, water-like liquid. May be dyed red for distribution.	
Odor	Mild petroleum distillate odor	
Odor Threshold	see table below	
pH	Not available	
Melting / Freeze Point	Not available	
Boiling Point And Range	>392 ^{0}F (>200^{0}C)	
Flash Point	>214 ^{0}F (101 ^{0}C)	
Evaporation Rate	<<1	(n-butyl acetate = 1)

Odor Threshold:

Parameter	Odor Detection	Odor Recognition
Methyl esters	Not available	>1000 ppm
Distillate	< 1ppm	Not available

Property	Value	Comments
Flammability	N/A	
Flammability Limits	N/A	(est)
Vapor Pressure	0.42 KPa (77^{0}F) (25 ^{0}C)	
Vapor Density	0.8	
Specific Gravity	>0.88	(water =1)
Solubility	Immiscible	
Partition Coefficient	N/A	as Log P
Autoignition Temperature	N/A	
Decomposition Temperature	Evaporation or ignition likely before decomposition will occur	
Viscosity	3.5-5 cSt	
Percent Volatiles	N/A	

10. STABILITY AND REACTIVITY

Reactivity
Material is not self-reacting.

Stability
Normally stable unless mixed with incompatibles or fire in presence of an ignition source.

Reactions / Polymerization
Stable. Hazardous polymerization will not occur.

Conditions to Avoid
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

Incompatible Materials
Keep away from strong acids and oxidizers.

Hazardous Decomposition Products
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:

Acute Toxicity (Oral LD50)
Methyl Esters

LD50 Oral Rat	>14400 mg/kg

Acute Toxicity (Oral LD50)
Distillate (various)

LD50 Oral Rat	>9g/kg

Skin Corrosion/Irritation: Causes skin irritation

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: May cause genetic defects

Carcinogenicity: OSHA: NO IARC: NO NTP: NO ACGIH: NO

Reproductive Toxicity: Not available

Teratogenicity: Not available

Specific Target Organ Toxicity (Repeated Exposure): Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract

Specific Target Organ Toxicity (Single Exposure): None.

Aspiration Hazard: This chemical may be aspirated. No known hazardous effects.

Potential Health Effects: None

Chronic effects: None

WARNING: The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

12. ECOLOGICAL INFORMATION

Toxicity
Material is not considered to be toxic.

EC50 Daphnia	Not toxic
LC 50 Fish	Not toxic

Persistence and Degradation: Not available

Bioaccumulative Potential: Not available

Mobility in Soil: Not available

Other Adverse Effects: None known

Other Information: Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options. May be considered a hazardous waste if disposed. Direct solid waste (landfill) or incineration at a solid waste facility is not permissible. Do not discharge to sanitary or storm sewer. Personnel handling waste containers should follow precautions provided in this document.

Shipping containers must be DOT authorized packages if considered a federally regulated hazardous waste or as prescribed by law. Follow licensure and regulations for transport of hazardous material and hazardous waste where applicable.

14. TRANSPORT INFORMATION

This product is not a hazardous material regulated under the Hazardous Material Transportation Act (HMTA)

US DOT

UN Identification Number	N/A
Proper Shipping Name	N/A
Hazard Class and Packing Group	N/A
Shipping Label	N/A
Placard / Bulk Package	N/A
Emergency Response Guidebook Guide Number	N/A

IATA Cargo

UN Identification Number	N/A
Shipping Name / Description	N/A

Hazard Class and Packing Group	N/A
ICAO Label	N/A
Packing Instructions Cargo	N/A
Max Quantity Per Package Cargo	N/A

IATA Passenger

UN Identification Number	N/A
Shipping Name / Description	N/A
Hazard Class and Packing Group	N/A
ICAO Label	N/A
Packing Instructions Passenger	N/A
Max Quantity Per Package	N/A

IMDG

UN Identification Number	N/A
Shipping Name / Description	N/A
Hazard Class and Packing Group	N/A
IMDG Label	N/A
EmS Number	N/A
Marine Pollutant	No

15. REGULATORY INFORMATION

U.S. Federal, State, and Local Regulatory Information
Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	No
Delayed (Chronic) Health Hazard	No
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Clean Water Act (Oil Spills)
Any spill or release of this product to “navigable waters” (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA Section 103 and SARA Section 304 (Release to the Environment)
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA Section 313- Supplier Notification
This product does not contain any chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

EPA Notification (Oil Spills)
If the there is a discharge of more than 1,000-gallons of oil into or upon navigable waters of the United States, or if it is the second spill event of 42 gallons or more of oil into water within a twelve (12) month period, a written report must be submitted to the Regional Administrator of the EPA within sixty days of the event.

Pennsylvania Right to Know Hazardous Substance list:
The following product components are cited in the Pennsylvania Special Hazardous Substance List, and are present at levels which require reporting: none.

New Jersey Right to Know Hazardous Substance list:
The following product components are cited in the New Jersey Right to Know Hazardous Substance List, and are present at levels which require reporting: none.

California Prop. 65
This product does not contain chemicals known to the State of California to cause Cancer or Reproductive Toxicity.

U.S. Toxic Substances Control Act
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

CEPA - Domestic Substances List (DSL)
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

Canadian Regulatory Information (WHMIS): none.

16. OTHER INFORMATION

Version	4
Issue Date	June 26, 2019
Prior Issue Date	May 2015

Description of Revisions
Section 3: Additional information on chemical composition
Section 14: Added statement that product is not a hazardous material per DOT HMTA.

Abbreviations

˚F	Degrees fahrenheit (temperature)
<	Less than
=	Equal to
>	Greater than
AP	Approximately
C	Centigrade (temperature)
kg	Kilogram
L	Liter
mg	Milligrams
mL	Milliliter
mm^2	Square millimeters
mmHg	Millimeters of mercury (pressure)
ppm	Parts per million
sec	Second
ug	Micrograms

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Level
ANSI	American National Standards Institute
API	American Petroleum Institute
CAS	Chemical Abstract Service
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation
EC50	Ecological concentration 50%
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
GHS	Global Harmonized System
HMIS	Hazardous Materials Information System
IARC	International Agency for Research On Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
Koc	Soil Organic Carbon
LC50	Lethal concentration 50%
LD50	Lethal dose 50%
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association

NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act Reauthorization Act of 1986 Title III
REL	Recommended Exposure Limit (NIOSH)
RVP	Reid Vapor Pressure
SARA	Superfund Amendments and
SCBA	Self Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
UN	United Nations
UNECE	United Nations Economic Commission for Europe
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

Disclaimer of Expressed and Implied Warranties
Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

** End of Safety Data Sheet **

Attachment XXV

HAP Speciation – API 19.4

Manual of Petroleum Measurement Standards Chapter 19.4

Evaporative Loss Reference Information and Speciation Methodology

THIRD EDITION, OCTOBER 2012

ADDENDUM 1, NOVEMBER 2013

ADDENDUM 2, JUNE 2017

AMERICAN PETROLEUM INSTITUTE

Table 4—Concentrations (weight percent) of Selected Components in Selected Petroleum Liquids

Compound	Gasoline	JP-4 [a] (Jet Naphtha)	Jet A (Jet Kerosene)	Diesel (Distillate Fuel Oil No. 2)	Crude Oil
n-hexane	1.0	1.5	0.005	0.0001	0.4
benzene	1.8 (3)	0.6	0.004	0.0008	0.6
iso-octane {2,2,4 trimethylpentane}	4.0	0.0	0.0	0.0	0.1
toluene	7.0	2.0	0.133	0.032	1.0
ethylbenzene	1.4	0.5	0.127	0.013	0.4
xylenes [b]	7.0	2.5	0.31	0.29	1.4
cumene {isopropylbenzene}	0.5	0.2	0.0	0.0	0.1
MTBE	(5)	0.0	0.0	0.0	0.0
1,2,4 trimethylbenzene	2.5	0.0	0.0	1.0	0.33
cyclohexane	0.24	1.2	0.0	0.0	0.7

NOTE 1 Concentrations in this table are the default values in EPA's TANKS software[24]. Actual product profiles may differ greatly from the TANKS default values, and TANKS has the ability to accept custom profiles.

NOTE 2 The benzene content shown for gasoline in this table was based on 1990 data. Benzene content in gasoline has been driven to significantly lower levels than this by the EPA Fuels Specifications.

NOTE 3 MTBE concentrations vary significantly. EPA[24,33] suggested in the early 1990s the following liquid-phase concentrations (weight percent). Subsequently, however, the use of MTBE as a gasoline additive has been phased out in the U.S.

Normal gasoline	Reformulated with MTBE	Oxygenated with MTBE
0	8.8	12.0

[a] The use of JP-4 in the United States was phased out in 1998.

[b] Xylenes includes mixed isomers; for convenience, TANKS[24] uses *m*-xylene to represent all isomers of xylene.

Table 5—Concentrations (weight percent) of Selected Components in No. 6 Fuel Oil

Species	Suggested Default (weight percent)
PACs	0.07
benzo(g,h,i)perylene	0.007
phenanthrene	0.09
benzene	0.002
biphenyl	0.02
cumene	0.002
cyclohexane	0.001
ethylbenzene	0.009
hexane (-n)	0.002
naphthalene	0.1
phenol	0
styrene	0
toluene	0.01
trimethylbenzene (1,2,4-)	0.1
xylenes (*m*, *o*, and *p*)	0.05

NOTE Source: Annex G (see Section G.3 and Table G.4).

Table 6—Concentrations of PAHs in Selected Petroleum Liquids (see Note 1)

		Concentrations (ppmw) in Selected Petroleum Liquids							
Compound	**CAS No.**	**Crude Oil**	**Gasoline**	**Diesel**	**Jet Fuel**	**Heavy Fuel Oil (Bunker)**	**Light Cycle Oil**	**Heavy Cycle Oil**	**Asphalt**
benzo[a]anthracene	56-55-3	6.4	5.3	2.5	0.0	144.9	11.3	344.0	8.2
benzo[a]phenanthrene {chrysene}	218-01-9	25.7	3.0	4.3	6.8	256.9	13.5	680.0	0.0
benzo[a]pyrene	50-32-8	2.4	2.4	0.0	0.0	127.6	1.6	61.4	0.0
benzo[b]fluoranthene	205-99-2	6.1	4.1	0.0	0.0	67.4	3.5	49.0	0.0
benzo[j]fluoranthene	205-82-3	See Note 2	See Note 2	0.0	0.0	See Note 2	See Note 2	See Note 2	0.0
benzo[k]fluoranthene	207-08-9	2.3	4.1	0.0	0.0	11.1	0.0	5.8	0.0
dibenzo[a,h]anthracene	53-70-3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
indeno[1,2,3-cd]pyrene	193-39-5	2.4	3.6	3.0	0.0	0.0	0.0	0.0	0.0
benzo[j,k]fluorene {fluoranthene}	206-44-0	5.7	3.0	10.2	0.0	34.1	88.1	390.0	0.0
benzo(r,s,t)pentaphene {dibenzo[a,i]pyrene}	189-55-9	0.0	0.0	2.6	0.0	9.4	0.0	0.0	0.0
Total PACs (ppm) (see Note 3)		**51.0**	**25.5**	**22.6**	**6.8**	**651.4**	**118.0**	**1530.2**	**8.2**
Other PAHs (not in the EPCRA Section 313 category for PACs)									
benzo(g,h,i)perylene	191-24-2	3.6	3.1	9.3	4.3	70.0	0.0	12.5	0.0
naphthalene	91-20-3	368.4	4150.0	756.5	796.7	630.7	4713.3	880.0	2.1

NOTE 1 The Canadian Petroleum Products Institute (CPPI) commissioned a speciation study of refinery streams[36], which included analyzing the streams for the presence of numerous polycyclic aromatic hydrocarbons (PAHs)–also known as polycyclic aromatic compounds (PACs). This study represents the most comprehensive dataset available for the concentration of these compounds in petroleum liquids. Results for the more common streams from that study are summarized in this table, with concentrations for compounds that are potentially subject to Toxic Chemical Release Inventory (TRI) reporting under EPCRA Section 313. See Annex F for additional background on the EPA characterization of PAHs and PACs.

NOTE 2 Included with benzo[b]fluoranthene.

NOTE 3 Total PACs includes all the compounds from the EPCRA Section 313 category for PACs that are identified by EPA as detected in these petroleum liquids[31]. EPCRA Section 313 specifies that these compounds are to be reported in aggregate, rather than individually. These PACs may be speciated in aggregate by using the Total PACs concentration given in this table (in the absence of more accurate data), and applying the physical properties of chrysene (from Table 3) as being representative of the entire group.

4.8 Tank Solar Absorptance α

The tank outside surface solar absorptance α is a function of its color and reflective condition. Table 7 provides solar absorptance values.

a) If the tank color is unknown, use the solar absorptance for white paint.

b) If the tank roof and shell have different solar absorptances, $\alpha = (\alpha_R + \alpha_S)/2$.

Attachment XXVI

Blendstock HAP Speciation Table

Blendstock HAP Summary								
	Current Blendstock	TABLE 7 Alkylate	TABLE 23 ATM Heavy Naphtha	Table 25 ATM light Ends	Table 26 Straight run gas	Table 28 ATM Straight run Naphtha	Table 30 Heavy HC Naphtha	Table 32 Light HC Cracked Naphtha
hexane	13.6	1.2 /0.01	6.48/0.8	13.6/8.3	13.6/8.3	12.1/5.72	2.46/0.137	18/2.56
benzene	2	0.291/0/01	1.57/0.36	2.06/1.93	4.64/1.33	5.23/1.2	1.1/0.228	5.46/0.7
224 tmp	4	nd	0.045/0.01	0.05/0.05	0.06/0.06	0.72/0.04	0.039/0.006	not reported
toluene	7.5	13.8/0.1	7.34/1.4	0.7/0.14	4.25/1.66	13.2/3.02	7.24/3.52	1.47/0.7
ethylebenzene	2	0.015/0.009	1/0.5	0.06/0.06	1/0.32	1.87/0.58	1.7/0.74	ND
xylenes	7	0.07/0.2	3.9/1.66	0.31/	3.3/2	11.6/1.51	4.3/1.6	ND
naphthalene	0.415	0.14/0.04	0.47/0.04	nd	nd	0.016/0.005	nd	0.01/0.003
cumene	0.5	0.15/0.01	0.158/0.168		0.06/0.57	0.3/0.131	0.34/0.134	nd
methanol	0	ND	not reported	Not reported	not reported	0.14/0.05	0.1/0.05	0.09/0.069

*Data from API Refinery Stream Composition Data - Update to Speciation data from API-4723 (API Document 4723-A- Dec 2018)

Attachment XXVII

Subpart Y Applicability

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ENGINEERING, PLLC

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Global Albany Terminal
NESHAP Subpart Y Applicability
August 2021

National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart Y (for Marine Tank Vessel Loading Operations) applies to new and existing sources at affected marine loading operations. Marine loading at the Global Albany Terminal would be an existing source with emissions less than 10 tons per year of a single HAP and less than 25 tons of total HAPs.

Existing sources with emissions less than 10 and 25 tons are not subject to the emission standards in Subpart Y. However, the recording keeping requirements of Subpart Y (63.567(j)(4)) do apply to existing sources with emissions less than 10 and 25 tons per 63.560(a)(3). This requires the facility to retain records of the emissions estimates determined in 63.565(l) and records of their actual throughputs for 5 years. The facility is required to calculate an annual estimate of HAPs from marine loading activities based on test data or measurement or estimating techniques generally accepted in industry practice.

Existing sources with actual throughput less than 10 M barrels (420 MM gal) of gasoline and 200 M barrels (8,400 MMgal) of crude are also not subject to the RACT standards of Subpart Y per 63.560(b)(2). If these throughputs are exceeded, the facility would become subject to the RACT requirements and would have three (3) years following the exceedance of the threshold levels to come into compliance with Subpart Y, in accordance with 63.560(e)(2)(iv). The actual throughputs at the Global Terminal have not exceeded these throughputs and therefore the RACT standards do not apply.

40 CFR 63.560(d) states that Subpart Y does not apply to the loading of products with a vapor pressure less than 1.5 psia at 20 degrees C (68 degrees F). The vapor pressure of ethanol is less than 1.5 psia at 20 degrees C and therefore Subpart Y does not apply to marine loading of ethanol.

Attachment XXVIII

MIP/CAM – VRU & VCU

July 2021

VRU Monitoring and Inspection Plan and CAM Plan
Truck Loading Rack VRU

Background

Facility Name	Global Companies LLC – Albany, NY Terminal
Street Address	50 Church Street, Port of Albany
City/Town/State	Albany, NY
Zip Code	12202

Source Information

Date Plan Submitted (mo/day/yr)	
Permit No. / Source ID No.	4-0101-00112/00029/1-RACK-1 VRUTK and VRUT2
Regulated Pollutant	VOC
CAS No.	0NY998-00-0
Emission Limit	2 mg/l

Submittal Type

MARK THE APPROPRIATE BOX BELOW AS TO WHY THIS PLAN IS BEING SUBMITTED.

☐ **Initial Submittal:** Only Gasoline Terminals subject to 40 CFR 63 Subpart BBBBBB National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities, 63.11092(b)(1)(i)(B)(2)

☐ **Renewal Application.**

☒ **Significant Modification to Control System. In June 2021, a new Vapor Recover Unit (VRU Unit-B) was installed. The existing VRU (Unit-A) is used as back-up to the newly installed VRU. In July 2021, the Monitoring and Inspection (M&I) Plan was updated to reflect current facility operation.***

☐ **Ownership Transfer**

***VRU (Unit - A) is Emission Source VRUT2**
VRU (Unit - B) is Emission Source VRUTK

Subpart BBBBBB Monitoring and Inspection Plan Applicability Determination

Is the source a Gasoline Terminal with a <u>thermal oxidizer other than an open flare</u> which must meet the requirements of 40 CFR 63.11092(b)(1)(iii)? (If yes determine applicability below)	☐YES ☒NO
APPLICABILITY: Is the oxidizer/enclosed flare fitted with a Continuous Parameter Monitoring System (CPMS) meeting the requirements of 40 CFR 63.11092(b)(1)(iii)(A) If YES: The remainder of this form need not be completed If NO: Complete the remainder of the form.	☐YES ☐NO
Is the source a Gasoline Terminal with a <u>carbon adsorption system</u> which must meet the requirements of 40 CFR 63.11092(b)(1)(i) **?** (If yes determine applicability below)	☒YES ☐NO
APPLICABILITY: Is the carbon adsorption system fitted with a Continuous Emissions Monitoring System (CEMS) meeting the requirements of 40 CFR 63.11092(b)(1)(i)(A) If YES: The remainder of this form need not be completed If NO: Complete the remainder of the form.	☒YES* ☐NO
*The terminal shall perform alternative monitoring per 40 CFR 63.11092(b)(1)(i)(B) during periods of CEMS downtime in accordance with the M&I Plan. Therefore, the remainder of this form is completed.	

CAM Applicability Determination

Does the source have a Pollutant Specific Emissions Unit (PSEU) that is subject to CAM, 40 CFR part 64, which must be addressed in a CAM plan submittal? To determine applicability, a PSEU must meet all of the following criteria (if no, then the remainder of this form need not be completed): ☒ YES ☐ NO

A. The PSEU is located at a major source that is required to obtain a Title V Permit:

B. The PSEU is subject to an emission limitation or standard for the applicable regulated air pollutant that is not exempt:

List of exempt emission limitations or standards:

- NSPS (40 CFR part 60) or NESHAP (40 CFR parts 61 and 63) proposed after 11/15/1990.
- Stratospheric ozone protection requirements.
- Acid rain program requirements.
- Emission limitations or standards for which a Title V Permit specifies a continuous compliance determination method, as defined in the CAM rule.
- An emission cap that meets the requirements specified in 40 CFR 70.4(b)(12).

C. The PSEU uses an add-on control device to achieve compliance with an emission limitation or standard.

D. The PSEU has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than major source threshold levels.

Note: A CEMS is used as the continuous monitoring parameter for this CAM. This facility is equipped with a Data Acquisition System (DAS) which stores data on a web server. Daily drift checks are performed automatically by the system.

During periods of CEMS downtime, the parameters specified in the M&I P / CAM Plan below shall be monitored.

Control Technology Description

VRU ID No 1-RACK1 VRUT2 and VRUTK

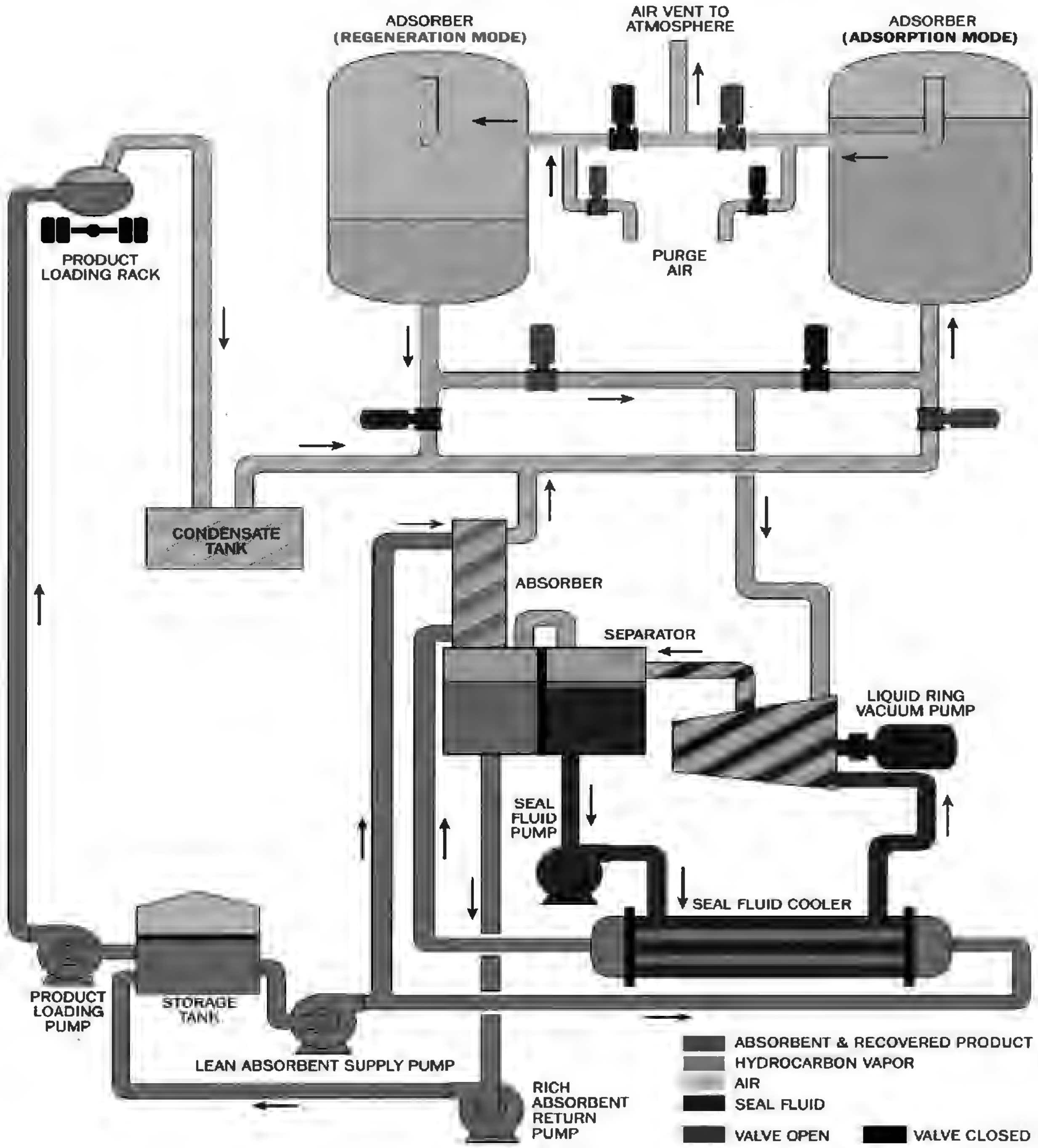
VRUT2 Unit A - John Zink VRU Model AA-1281-11-7

VRUTK Unit B = John Zink VRU Model RSSEAA-N3080-0810-1008-25

VRU Type

VOC emissions are controlled by a John Zink Vapor Recovery Unit (VRU) (e.g., Model RSSEAA-N3080-0810-1008-25). The VRU is guaranteed by the manufacturer to have a VOC emission control rate of 2 mg/l or better of gasoline/liquid product loaded. Figure 1 provides a schematic of a typical John Zink Carbon Adsorption System. Unit A VRU (Model AA-1281-11-7) is used as a back-up to the primary VRU.

Carbon adsorption vapor recovery systems use beds of activated carbon to remove gasoline vapors from the air-vapor mixture. These units consist of two vertically positioned carbon beds and a carbon regeneration system. During gasoline tank truck loading activity, one carbon bed is used for adsorption while the other bed is being regenerated, using by vacuum application accompanied by an air purge.


ADSORBER
(REGENERATION MODE)
AIR VENT TO ATMOSPHERE
ADSORBER
(ADSORPTION MODE)
PURGE AIR
PRODUCT LOADING RACK
CONDENSATE TANK
ABSORBER
SEPARATOR
LIQUID RING VACUUM PUMP
SEAL FLUID PUMP
SEAL FLUID COOLER
PRODUCT LOADING PUMP
STORAGE TANK
LEAN ABSORBENT SUPPLY PUMP
RICH ABSORBENT RETURN PUMP
ABSORBENT & RECOVERED PRODUCT
HYDROCARBON VAPOR
AIR
SEAL FLUID
VALVE OPEN
VALVE CLOSED

Major / Non-Major Source Determination*

VOC Potential to Emit (TPY) Post Control less than 50
Major Source Thresholds (TPY) 50
VOC PTE (TPY) ☒ **less than** ☐ **greater than** major source threshold

* Non major or small units are those with a pre-control device potential to emit greater than the major source thresholds, but post-control device potential to emit less than the major source thresholds. Major or large units are those with a pre-control device and post-control device potential to emit greater than the major source thresholds.

Monitoring and Inspection Plan / CAM Plan

I. General Criteria

Indicator	**Indicator 1**	**Indicator 2**
	Carbon Bed Temperature	Carbon regeneration cycle vacuum pressure
Measurement Approach	Bed temperature measured continuously via probe inserted directly in bed. Signal from probe directed to external thermocouple.	Carbon bed when not in use collecting VOC is in regeneration cycle. Regeneration performed with bed under vacuum in combination with air purge. Pressure gauge in line measures pressure in inches of Hg and verifies that bed is under vacuum and regeneration in progress.
II. Indicator Range	< 175 F If temperature > 175 F for two consecutive 30 minute bed regeneration cycles or > 200 F for a single cycle corrective action warranted.	Vacuum during regeneration > 25 " Hg sustained. If the vacuum is not sustained for an entire cycle, observe an additional cycle. If the vacuum is not sustained during either of the cycles, corrective action is warranted.
Quality Improvement Plan (QIP)		
III. Performance Criteria:		
Data Representativeness	Temperature probe placed directly in carbon bed. Rise in bed temperature indicative of poor performance or reduced VOC adsorption capacity.	Pressure or vacuum gauge placed in line such that it measures vacuum placed on carbon bed directly. If vacuum placed on bed is not adequate VOC may not be recovered and carbon bed not adequately regenerated. Bed if not regenerated properly will have reduced capacity for sorption of volatile organics.
Verification of Operational Status	See Attachment 1 for checklist	See Attachment 1 for checklist

QA/QC Practices and Criteria	• Thermometer temperature calibrations performed annually. Accuracy of the thermometer will be determined against known standards. • Preventative maintenance (PM) of VRU performed at a minimum on a semi-annual basis by a certified subcontractor. • Terminal staff perform daily checks to verify operational status of VRU and adherence to system performance criteria. • Compliance testing of VRU emissions in compliance with the facility permit. Compliance testing includes demonstration that VOC emissions are below permit limit (mg VOC/liter product loaded).	• Preventative maintenance (PM) of VRU performed at a minimum on a semi-annual basis. By certified subcontractor to determine that the duration of vacuum is adequate for thorough bed regeneration. Pressure gauge calibrations performed annually. Annually test the carbon for absorption capacity. • Terminal staff perform daily checks to verify operational status of VRU and adherence to system performance criteria. • Compliance testing of VRU emissions in compliance with the facility permit. Compliance testing includes demonstration that VOC emissions are below permit limit (mg VOC/liter product loaded).
Monitoring Frequency and Data Collection Procedure	Readings collected on a daily basis by direct reading of carbon bed temperature gauge for small CAM sources. Readings are recorded as the nearest 5 F increment (+/- 5 F). Duration of reading, at least one loading cycle of each carbon bed, approximately 30 minutes. Data recorded and reported on a daily basis. If the reading exceeds the indicator threshold value of 175 F a second reading will be collected during the course of the next 30-minute bed loading cycle. If the second reading is above the threshold value, corrective action is taken.	Readings collected on a daily basis by direct reading of vacuum gauge for small CAM sources. Duration of reading at least one regeneration cycle of each bed, approximately 30 minutes. Data recorded and reported on a daily basis. If the pressure reading is below the indicator threshold value of 25 " Hg a second reading will be collected during the course of the next 30-minute bed loading cycle. If the second reading is below the threshold value corrective action is taken.

IV. Corrective Action	If the system is shutdown, the system is reset. If the problem persists or another issue arises that needs corrective action the following steps are followed. (i) Initiate corrective action to determine the cause of the problem within 1 hour; (ii) Initiate corrective action to fix the problem within 24 hours; (iii) Complete all corrective actions needed to fix the problem as soon as practicable consistent with good air pollution control practices for minimizing emissions; (iv) Minimize periods of start-up, shutdown, or malfunction; and (v) Take any necessary corrective actions to restore normal operation and prevent the recurrence of the cause of the problem.
V. Other	Under the alternative monitoring scenario, perform monthly monitoring of the VRU vent stack with an LEL meter. Measure during the last 5 minutes of an adsorption cycle for each carbon bed and compare the LEL meter reading versus the VOC emissions rate chart. Measurements shall be less than the 2 mg/L limit of the permit. (See Attachment 1 for checklist). In addition to the items listed elsewhere in this plan, the terminal shall ensure proper valve sequencing, regeneration cycle time, gasoline flow, and purge air flow daily (See Attachment 1 for checklist).

Glossary of Terms

Acronym	**Definition**
VRU	Vapor Recovery Unit
VOC	Volatile Organic Compounds
TYP	Tons Per Year
PTE	Potential to Emit
QIP	Quality Improvement Plan

ATTACHMENT 1

Attachment 1

Date: ______________________

VRU Daily Compliance Checklist

Inspect each item and place a "Y" in the corresponding daily box for any item which is operating within normal parameters. Place an "N" in the box which corresponds to any item which is not operating within normal parameters. Record a value where indicated. Notify the Terminal Superintendent immediately of any discrepancies identified. Refer to the Alternative Monitoirng Plan for corrective action. All corrective action must be documented in log maintained on site. Record any actions taken in response to out-of-range readings in the comment section. Sign in the appropriate daily signature section.

RECORD READINGS

		S	M	T	W	T	F	S
Observe one (1) complete regeneration cycle and record **maximum** carbon bed vacuum reading for each bed (**Min: 25" Hg**).* and length of regeneration cycle								
Bed A: RECORD VALUE	MIN 25"							
Bed B: RECORD VALUE	MIN 25"							
Note duraction of cycle time: (if not min of 25" REFER TO ALTERNATIVE MONITORING PLAN FOR CORRECTIVE ACTION)								

*If minimum vacuum not reached, observe an additional regeneration cycle and record reading below.

Additional cycles (only if first cycle did not meet setpoint)								
cycle 2 Bed A: RECORD VALUE	MIN 25"							
Bed B: RECORD VALUE	MIN 25"							

*If at least one (1) cycle meets the setpoint, no further action required. In NO additional cycle meets setpoint,
REFER TO ALTERNATIVE MONITORING PLAN FOR CORRECTIVE ACTION

RECORD READINGS

Pressure Readings	S	M	T	W	T	F	S
Gasoline Inlet Absorber Pressure (flow) - Top							
Was manual adjustment required?							
Document valve adjustment in corrective action log							
Temperature Readings Gasoline Supply Temperature (°F) - should be LESS THAN 110 °F							
Liquid Seal Temperature leaving the Heat Exchanger (°F) - should be LESS THAN 120 °F							

If temperatures are not less than setpoints, REFER TO ALTERNATIVE MONITORING PLAN FOR CORRECTIVE ACTION

Note Y if operating properly.

Visually verify the following:								
Proper valve sequencing - did valves sequence and unit stayed in operation? IF NO REFER TO ALTERNATIVE MONITORING MANUAL FOR CORRECTIVE ACTION								
CYCLE TIME Visually observe and note cycle time. IF SETPOINT NOT MET REFER TO ALTERNATIVE MONITORING MANUAL FOR CORRECTIVE ACTION	CEM Start Mode Setpoint:							
	Remote Start Setpoint:							
PURGE AIR FLOW During regeneration cycle, confirm vacuum level slightly decreases when purge air valve opens.								
Vacuum level should be between 26" and 27" (site specific, may be 28-29) when purge air valve opens.	Note Vacuum Level							
If during purge air, vacuum is outside of setpoint range, manually adjust valve to between setpoint range								
Was manual adjustment of purge flow required?								
DOCUMENT VALVE ADJUSTMENT IN CORRECTIVE ACTION LOG								

ONCE PER MONTH VOC Measurement from Outlet of Beds								
Bed A:	RECORD VALUE							
Bed B:	RECORD VALUE							

Measure VOCs from outlet of carbon bed. Record over last 5 min of an adsorption cycle for each bed, document highest VOC concentration

Operator's Remarks	Day	Init.	Date	Time	Tank Volume
	Sun				
	Mon				
	Tues				
	Wed				

September 2019

VCU Monitoring and Inspection Plan and CAM Plan
Railcar Loading Rack VCU

Background

Facility Name	Global Companies LLC – Albany, NY Terminal
Street Address	50 Church Street, Port of Albany
City/Town/State	Albany, NY
Zip Code	12202

Source Information

Date Plan Submitted (mo/day/yr)	08/30/19
Permit No. / Source ID No.	4-0101-00112/00029/1-RACK2 VCURR
Regulated Pollutant	VOC
CAS No.	0NY998-00-0
Emission Limit	10 mg/l

Submittal Type

MARK THE APPROPRIATE BOX BELOW AS TO WHY THIS PLAN IS BEING SUBMITTED.

☐ **Initial Submittal:** Only Gasoline Terminals subject to 40 CFR 63 Subpart BBBBBB National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities, 63.11092(b)(1)(iii)(B)(2)

☐ **Renewal Application.**

☒ **Significant Modification to Control System. In August 2019, the Monitoring and Inspection (M&I) Plan was updated to reflect current facility operations, and to incorporate the Compliance Assurance Monitoring (CAM) Plan into a single document.**

☐ **Ownership Transfer**

Subpart BBBBBB Monitoring and Inspection Plan Applicability Determination

Is the source a Gasoline Terminal with a <u>thermal oxidizer other than an open flare</u> which must meet the requirements of 40 CFR 63.11092(b)(1)(iii)? (If yes determine applicability below)	☒YES ☐NO
APPLICABILITY: Is the oxidizer/enclosed flare fitted with a Continuous Parameter Monitoring System (CPMS) meeting the requirements of 40 CFR 63.11092(b)(1)(iii)(A) If YES: The remainder of this form need not be completed If NO: Complete the remainder of the form.	☐YES ☒NO
Is the source a Gasoline Terminal with a <u>carbon adsorption system</u> which must meet the requirements of 40 CFR 63.11092(b)(1)(i) **?** (If yes determine applicability below)	☐YES ☒NO
APPLICABILITY: Is the carbon adsorption system fitted with a Continuous Emissions Monitoring System (CEMS) meeting the requirements of 40 CFR 63.11092(b)(1)(i)(A) If YES: The remainder of this form need not be completed If NO: Complete the remainder of the form.	☐YES ☐NO

CAM Applicability Determination

Does the source have a Pollutant Specific Emissions Unit (PSEU) that is subject to CAM, 40 CFR part 64, which must be addressed in a CAM plan submittal? To determine applicability, a PSEU must meet all of the following criteria (if no, then the remainder of this form need not be completed): ☒ YES ☐ NO

A. The PSEU is located at a major source that is required to obtain a Title V Permit:

B. The PSEU is subject to an emission limitation or standard for the applicable regulated air pollutant that is not exempt:

List of exempt emission limitations or standards:

- NSPS (40 CFR part 60) or NESHAP (40 CFR parts 61 and 63) proposed after 11/15/1990.
- Stratospheric ozone protection requirements.
- Acid rain program requirements.
- Emission limitations or standards for which a Title V Permit specifies a continuous compliance determination method, as defined in the CAM rule.
- An emission cap that meets the requirements specified in 40 CFR 70.4(b)(12).

C. The PSEU uses an add-on control device to achieve compliance with an emission limitation or standard.

D. The PSEU has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than major source threshold levels.

Control Technology Description

VCU ID No.	1-RACK2 VCURR
VCU Type	John Zink Vapor Combustion Unit, Model # ZTC-2-8-35-2-3/6-X

The major components of a **Vapor Combustion Unit (VCU)** are shown in Figure 1. Normal operation of the VCU typically consists of stack purge, pilot ignition, normal operation, normal shutdown and fault-related shutdown steps.

When either a local or remote start signal is received by the VCU, the assist air blower starts and purges the stack to help ensure that a flammable mixture is not present. After the purge is complete, the pilot ignites and must be confirmed by the flame monitor in order for the operation to proceed.

Once the pilot is confirmed, the system is ready for normal operation, and provides a "permissive" signal to the rack operating system that loading may begin.

The assist air blower provides a portion of the combustion air and mixing energy to ensure smokeless combustion of the vapors.

When the start signal is removed, the system begins a normal shutdown. The vapor shutdown valves and fuel gas shutdown valves close, and the pilot is extinguished. In addition the assist gas control valve closes, the quench air damper opens and the assist air blower stops.

If an unsafe condition, such as loss of pilot or assist air blower failure, is detected during operation, the system immediately initiates an annunciated fault-related shutdown, which results in the same system status as described for the normal shutdown. The system cannot be restarted until the fault is corrected and the system is reset.

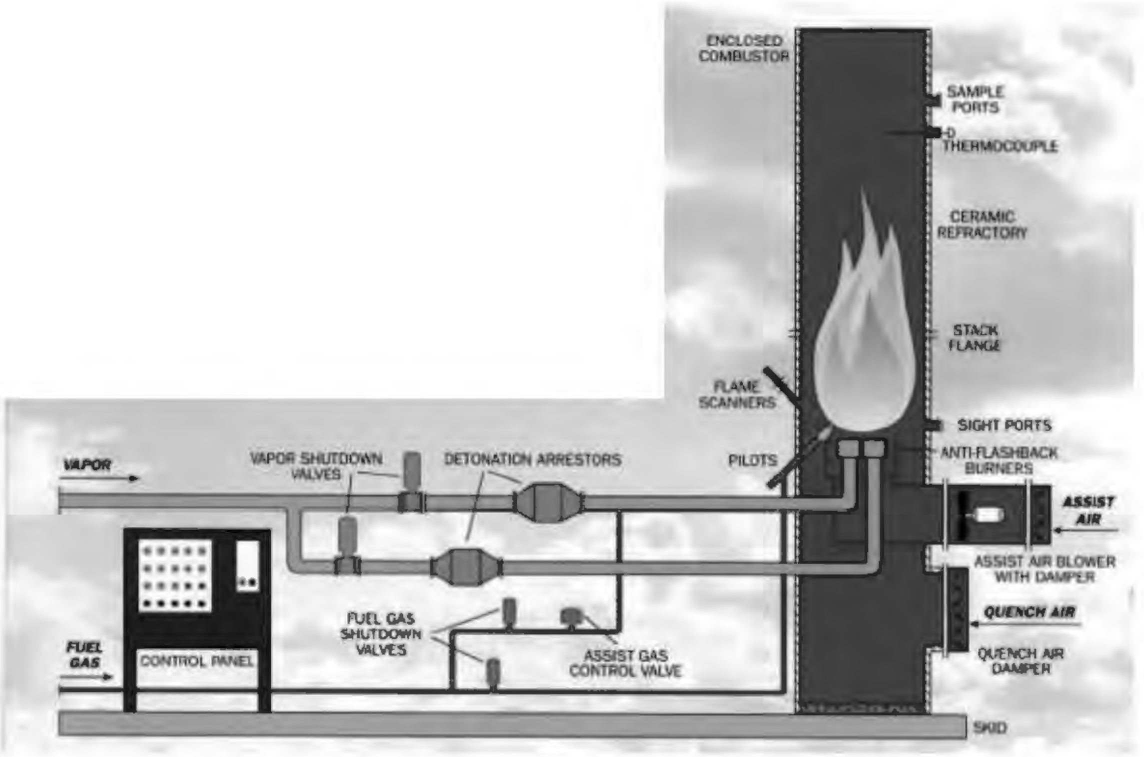


Figure 1. Vapor Combustion Unit (VCU) – System Schematic

Major / Non-Major Source Determination*

VOC Potential to Emit (TPY) Post Control <50
Major Source Thresholds (TPY) 50
VOC PTE (TPY) ☒ **less than** ☐ **greater than** major source threshold

* Non major or small units are those with a pre-control device potential to emit greater than the major source thresholds, but post-control device potential to emit less than the major source thresholds. Major or large units are those with a pre-control device and post-control device potential to emit greater than the major source thresholds.

Monitoring and Inspection Plan / CAM Plan

I. General Criteria

Indicators	Presence of Pilot Flame; Proper Operation of Assist-Air blower, Vapor Line Valve and Emergency Shutdown system.
Monitoring Approach	• Ultraviolet Flame Detector (UFD) monitors presence of flame on a continuous basis and generates an electric signal. • After a rail tanker car is hooked up at the loading rack, a remote signal is sent to the VCU programmable logic controller (PLC) to automatically ignite the pilot flame. The PLC will shut down the combustion system due to pilot failure, improper operation of the air assist blower, failure of the vapor line valve to operate, or pressures outside of system parameters. After the UFD verifies that a flame is present and other systems are operational, it sends a permissive signal to the loading rack allowing loading to proceed. If the UFD signal is lost during loading or other system components are not operational or within system parameters, the loading rack automatically shuts down and the VCU alarm sounds at the loading rack.
II. Indicator Range	Electrical signal generated by UFD indicates flame is on and loss of signal indicates flame is absent.
Quality Improvement Plan	Minimize excursions per calendar quarter. Excursion threshold defined as failure of automatic shutdown system (i.e loading of product with loss of UFD signal (e.g., flame absent) or system pressures outside of VCU pressure limits).