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December 20, 2021

NYSDEC Regional Permit Administrator
Region 1 Headquarters
Division of Environmental Permits
Stony Brook University
50 Circle Road
Stony Brook, NY 11790-3409

Re: Global Companies LLC – Inwood Terminal
Title V Facility Permit No. 1-2820-00947/00002
Title V Facility Permit Modification Application

To Whom it May Concern,

On behalf of Global Companies LLC (Global), Envirospec Engineering, PLLC (Envirospec) is submitting the enclosed application for a Title V Facility Permit Modification at the Global Companies - Inwood Terminal (Terminal) located at 464 Doughty Boulevard, Inwood, New York, as well as application forms and Potential to Emit (PTE) calculations in support of a proposed increase in the permitted gasoline throughput at the facility and adoption of a lower emission rate at the truck loading rack. The terminal currently operates under Title V Facility Permit No. 1-2820-00947/00002 which expired on January 16, 2017, and which a renewal application was submitted on July 13, 2016.

The current permit limit includes an annual facility throughput of 450,000,000 gallons of gasoline. Global is requesting to increase the annual facility gasoline throughput to 603,300,000 gallons of gasoline; however, potential emissions for the facility will decrease due to the implementation of the following measures:

- The VRU limit will be reduced from 10 mg/L to 3 mg/L for the majority of gasoline throughput as part of this modification (the current limit of 10 mg/L will remain for when the existing VRU is utilized as a back-up unit). This reduction will substantially reduce potential emissions, and
- A vacuum assist will be installed to eliminate loading fugitive emissions. This will substantially reduce emissions on a per gallon loaded basis.

The Project Emission Potential for the annual gasoline throughput increase to 603,300,000 gallons with the 3 mg/L VRU and vacuum assist shows a projected emissions of 8.19 tons per year, less than the pre-project baseline emissions of 18.60 tons per year.

The attached PTE calculations show the control efficiency of 3 mg/L at the loading rack with the vacuum assist. The proposed throughput increase does not meet the definition of a NSR major modification in 6 NYCRR 231-4 or result in a project emission potential (PEP) which equals or exceeds the applicable significant project threshold defined in 6 NYCRR 231-13. A PEP is attached to support this.

The enclosed application package includes the following:

- Modification Application Forms including certification
- Annotated Permit
- Emission Unit Matrix
- Project Emission Potential (PEP)
- List of Exempt Activities
- Method of Compliance Form
- Facility Potential to Emit (PTE)
- Part 212 Modeling Protocol
- Long Environmental Assessment Form

The Terminal is subject to the requirements of 6 NYCRR 212 (Part 212). This application includes a Part 212 Modeling Protocol which Global intends to use to demonstrate compliance with Part 212.

This application is complete based on the requirements in 6 NYCRR Part 201-5.2(b), as outlined below:

- A list and description of all affected emission sources at the facility
  - Provided on the Application Forms.
- A listing of the Standard Industrial Classification (SIC) or North American Industry Classification System (NAICS) codes which correspond to the primary operations carried out at the facility
  - Provided on the Application Forms.
- A description of all affected processes, their associated emissions sources and products
  - Provided on the Application Forms.
- A list of all affected emission points including the required parameters
  - Provided on the Application Forms.
- Any other information requested by the department
  - N/A

Should you have any questions please feel free to contact me at (518) 453-2203 or Tom Keefe of Global at (781) 398-4132.

Sincerely,

Gianna Aiezza

Gianna Aiezza, PE
Principal Engineer
Envirospec Engineering, PLLC

Cc: Tom Keefe – Global Companies LLC
Steve Charron – Global Companies LLC
Hank Meyerhoefer – Terminal Operations Manager, Global Companies LLC

New York State Department of Environmental Conservation
Air Permit Application

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

DEC ID	Application ID	Application Type
1-2820-00947	1-2820-00947/00002	State Facility × Title V

Section I - Certification

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information required to complete this application, I believe the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Responsible Official Tom Keefe	Title Vice President EHS
Signature [signature]	Date 12/20/2021

Professional Engineer Certification

I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments as they pertain to the practice of engineering. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Professional Engineer Gianna Aiezza	NYS License No. 081422
Signature [signature]	Date 12/20/21

Section II - Identification Information

Type of Permit Action Requested

New Renewal × Significant Modification Administrative Amendment Minor Modification

Application for the construction of a new facility — Application involves the construction of new emission unit(s)

Facility Information

Name Global Companies LLC - Inwood Terminal	
Location Address 464 Doughty Boulevard	
City / Town / ✓ Village Inwood	Zip 11096

Owner/Firm Information — **Business Taxpayer ID**

Name Global Companies LLC			
Street Address 800 South Street			
City Waltham	State/Province MA	Country United States	Zip 02453

Owner Classification: Federal State Municipal × Corporation/Partnership Individual

Owner/Firm Contact Information

Name Tom Keefe			Phone (781) 398-4132
E-mail Address tkeefe@globalp.com			Fax (718) 398-9212
Affiliation Global Companies LLC			Title VP EHS Operations
Street Address 800 South Street			
City Waltham	State/Province MA	Country United States	Zip 02453

Facility Contact Information

Name Hank Meyerhoefer			Phone (516) 371-8511
E-mail Address hmeyerhoefer@globalp.com			Fax
Affiliation Global Companies LLC			Title Terminal Manager
Street Address 464 Doughty Boulevard			
City Inwood	State/Province NY	Country United States	Zip 11096

New York State Department of Environmental Conservation
Air Permit Application

DEC ID
1 - 2 8 2 0 - 0 0 9 4 7

Project Description ☐ Continuation Sheet(s)

The purpose of this application is to modify the Title V permit to increase the gasoline throughput of the truck rack to 603,300,000 gallons per year from the previous throughput of 450,000,000 gallons per year. A new VRU will be installed, and the existing VRU will be used as a backup. The new VRU emission limit will be 3 mg/L, with the backup VRU remaining at the current 10 mg/L as part of this modification. Additionally, a vacuum assist will be installed to eliminate fugitive emissions associated with loading.

Section III - Facility Information

Facility Classification

☐ Hospital ☐ Residential ☐ Educational/Institutional ☐ Commercial ☒ Industrial ☐ Utility

Affected States (Title V Applications Only)

☐ Vermont ☐ Massachusetts ☐ Rhode Island ☐ Pennsylvania Tribal Land: ___________________

☐ New Hampshire ☒ Connecticut ☐ New Jersey ☐ Ohio Tribal Land: ___________________

SIC Code(s)			NAICS Code(s)			
5171			424710			

Facility Description ☐ Continuation Sheet(s)

The facility is classified as a gasoline/distillate loading terminal consisting of five (5) permitted storage tanks along with other storage tanks containing gasoline additives and distillate (including biodiesel and renewable diesel). One (1) loading rack with six (6) bays is located onsite. Gasoline loading is controlled with a vapor recovery unit with vacuum assist.

Compliance Statements (Title V Applications Only)

I certify that as of the date of this application the facility is in compliance with all applicable requirements. ☐ Yes ☐ No

If one or more emission units at the facility are not in compliance with all applicable requirements at the time of signing this application (the 'NO' box must be checked), the noncomplying units must be identified in the "Compliance Plan" block on page 8 of this form along with the compliance plan information required. For all emission units at the facility that are operating <u>in compliance</u> with all applicable requirements, complete the following:

☒ This facility will continue to be operated and maintained in such a manner as to assure compliance for the duration of the permit, except those emission units referenced in the compliance plan portion of this application.

☒ For all emission units subject to any applicable requirements that will become effective during the term of the permit, this facility will meet such requirements on a timely basis.

☒ Compliance certification reports will be submitted at least once per year. Each report will certify compliance status with respect to each applicable requirement, and the method used to determine the status.

Facility Applicable Federal Requirements ☒ Continuation Sheet(s)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	200		6					
6	NYCRR	201	6	4	a	7			
6	NYCRR	201	6	4	c				
6	NYCRR	201	6	4	c	2			

Facility State Only Requirements ☐ Continuation Sheet(s)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
	ECL	19	0301						
6	NYCRR	201	1	4					
6	NYCRR	225	3	4					

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Facility Compliance Certification

× Continuation Sheet(s)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	201	7.1	a					

Requirement	Capping	CAS Number	Contaminant Name
× Applicable Federal Requirement __ State Only Requirement	× Capping	0NY998-00-0 and 0NY100-00-0	VOC and Total HAP

Monitoring Information

× Work Practice Involving Specific Operations | Ambient Air Monitoring | Record Keeping/Maintenance Procedures

Compliance Activity Description

Gasoline product throughput shall be limited to keep total HAP emissions less than 24.9 tons/yr and keep individual HAP emissions below 9.9 tons/yr; less than the applicability thresholds of 40 CFR 63, Subpart R.

Gasoline product throughputs shall be included in the annual compliance report. This capping condition is applicable for 1-RACK1, RGS, FTV.

Work Practice Type Code	Process Material Code	Process Material Description	Reference Test Method
03	017	Gasoline	N/A

Monitored Parameter Code	Monitored Parameter Description	Manufacturer's Name/Model Number
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
603,300,000	N/A	18	gallons per year

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
71	Annual Total Rolled Monthly	05	Monthly	15	Annually (Calendar)

Facility Emissions Summary

× Continuation Sheet(s)

CAS Number	Contaminant Name	Potential to Emit (tons/yr)	Actual Emissions (pounds/yr)
0NY075 - 00 - 5	PM-10	0.01	
0NY750 - 02 - 5	PM-2.5	0.01	
007446 - 09 - 5	Sulfur Dioxide	0.00	
0NY210 - 00 - 0	Oxides of Nitrogen	0.17	
000630 - 08 - 0	Carbon Monoxide	0.00	
007439 - 92 - 1	Lead (elemental)	N/A	
0NY998 - 00 - 0	Total Volatile Organic Compounds	45.79	
0NY100 - 00 - 0	Total Hazardous Air Pollutants	1.697	
0NY750 - 00 - 0	Carbon Dioxide Equivalents	200.03	
000110-54-3	Hexane	0.204	
000071-43-2	Benzene	0.238	
000540-84-1	Pentane, 2,2,4-Trimethyl-	0.279	
000108-88-3	Toluene	0.387	

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Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
Facility Applicable Federal Requirements (continuation)									
6	NYCRR	201	6	4	c	3	ii		
6	NYCRR	201	6	4	e				
6	NYCRR	202	2	1					
6	NYCRR	202	2	5					
6	NYCRR	215		2					
6	NYCRR	200		7					
6	NYCRR	201	1	7					
6	NYCRR	201	1	8					
6	NYCRR	201	3	2	a				
6	NYCRR	201	3	3	a				
6	NYCRR	201	6	4	a	4			
6	NYCRR	201	6	4	a	8			
6	NYCRR	201	6	4	f	6			
6	NYCRR	202	1	1					
40	CFR	68							
40	CFR	82	F						
6	NYCRR	201	6						
6	NYCRR	201	6	4	d	4			
6	NYCRR	201	7	1	a				
6	NYCRR	211		1					
6	NYCRR	225	1	2					
6	NYCRR	225	1	8					
6	NYCRR	225	3	3	a				
6	NYCRR	225	3	4	a				
6	NYCRR	229		3	a				
6	NYCRR	229		5					
40	CFR	60	A	7	a				
40	CFR	60	Kb	113b	a				
40	CFR	60	Kb	115b	a				
40	CFR	60	Kb	116b					
40	CFR	60	XX	502					

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Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
Facility Applicable Federal Requirements (continuation)									
40	CFR	63	BBBBBB	11089					
6	NYCRR	201	6						
6	NYCRR	201	7	1	a				
40	CFR	63	BBBBBB	11088					
40	CFR	63	BBBBBB	11092	a				
6	NYCRR	212		10	c	1			
40	CFR	60	XX	505	b				
40	CFR	60	XX	505	c				
40	CFR	60	XX	505	f				
40	CFR	64							
6	NYCRR	229		3	e	1			
40	CFR	63	BBBBBB	11092	e	1			
40	CFR	60	Kb	112b	a	1			

Continuation Sheet ____ of ____

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Facility Emissions Summary (continuation)				
CAS No.	Contaminant Name	Potential to Emit		Actual Emissions (lbs/yr)
		(lbs/yr)	Range	
000100-41-4	Ethylbenzene	0.078		
001319-77-3	Xylenes, M, O & P	0.453		
000098-82-8	Cumene	0.007		
000091-20-3	Naphthalene	0.005		

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Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	201	7	1	a				

- ☒ Applicable Federal Requirement
- ☐ State Only Requirement
- ☒ Capping

CAS No.	Contaminant Name
0NY988-00-0 and 0NY100-00-0	VOC and Total HAP

Monitoring Information

- ☐ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☐ Monitoring of Process or Control Device Parameters as a Surrogate
- ☒ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

Gasoline product throughput shall be limited to keep total HAP emissions less than 24.9 tons/yr and keep individual HAP emissions below 9.9 tons/yr; less than the applicability thresholds of 40 CFR 63, Subpart R.

Gasoline product throughputs shall be included in the annual compliance report. This capping condition is applicable for 1-RACK1, RGB, FTV.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
03	017	Gasoline	N/A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
180,999,000	N/A	18	gallons per year

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
71	Annual Total Rolled Monthly	05	Monthly	15	Annually (Calendar)

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Section III - Facility Information

Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	201	7	1	a				

		CAS No.	Contaminant Name
☒ Applicable Federal Requirement ☐ State Only Requirement	☒ Capping	0NY988-00-0 and 0NY100-00-0	VOC and Total HAP

Monitoring Information

- ☐ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☐ Monitoring of Process or Control Device Parameters as a Surrogate
- ☒ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

The emission rate of the vapor control devices shall be limited to keep total HAP emissions below 24.9 tons/yr and keep individual HAP emissions below 9.9 tons/yr which is less than the applicability thresholds of 40 CFR 63 Subpart R. Facility wide emissions were determined using the most current AP-42 formulas. The throughput limits were calculated for various operating scenarios. For the purpose of determining compliance based on source-wide throughput of gasoline (or ethanol), the following equivalencies shall be used to determine compliance with alternative operating scenarios. Each gallon (gal) of gasoline is equivalent to:

Operating Scenario Loading Equivalent (gal)
= to One (1) gal of Gasoline

Gasoline Operating Scenario (OS)

1.0	#GAS1: Truck loading using VRU (VRU01) at 3 mg/L with Vac Assist (VACTK)
0.3	#GAS2: Truck loading using backup VRU (VRU02) at 10 mg/L with Vac Assist (VACTK)
0.1667	#GAS3: Truck loading using backup VRU (VRU02) with no Vac Assist (VACTK)

Compliance will be determined based on the following equation:

Total Throughput of Gasoline (gal) - (gal loaded from OS #1) + (gal loaded from OS #2 / 0.3) + (gal loaded from OS #3 / 0.1667)

(Continued)

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
N/A	N/A	N/A	Method 25A or 25B, Method 21, Method 2A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
0NY502000	40 CFR 60-63 - Total Organic Compounds (TOC)	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
10	N/A	318	milligrams per liter

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
60	Maximum - Not to Exceed Stated Value - See Monitoring Description	14	As Required - See Permit Monitoring Description	15	Annually (Calendar)

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Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause

☐ Applicable Federal Requirement
☐ State Only Requirement
☐ Capping

CAS No.	Contaminant Name

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as a Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Maximum annual throughput of each gasoline operating scenario assuming no loading under any other OS is as follows:

OS#GAS1: 603,300,000 gallons (assumes all other OS are zero)
OS#GAS2: 180,990,000 gallons (assumes all other OS are zero)
OS#GAS3: 100,550,000 gallons (assumes all other OS are zero)

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
N/A	N/A	N/A	N/A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
N/A	N/A	N/A	N/A

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
N/A	N/A	N/A	N/A	N/A	N/A

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Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	201	7	1	a				

Requirement	Capping	CAS No.	Contaminant Name
☒ Applicable Federal Requirement ☐ State Only Requirement	☒ Capping	0NY998-00-0 and 0NY100-00-0	VOC and Total HAP

Monitoring Information

- ☐ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☐ Monitoring of Process or Control Device Parameters as a Surrogate
- ☒ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

Distillate throughput shall be limited to keep total HAP emissions less than 24.9 tons/yr and keep individual HAP emissions below 9.9 tons/yr; less than the applicability thresholds of 40 CFR 63, Subpart R.

Distillate throughputs shall be included in the annual compliance report. This capping condition is applicable for 1-RACK1, RDS.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
03	036	Distillates - Number 1 and Number 2 Oil	N/A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
200,000,000	N/A	18	gallons per year

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
71	Annual Total Rolled Monthly	05	Monthly	15	Annually (Calendar)

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Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	201	7	1	a				

		CAS No.	Contaminant Name
☒ Applicable Federal Requirement	☒ Capping	0NY998-00-0 and 0NY100-00-0	VOC and Total HAP
☐ State Only Requirement			

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as a Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

The emissions rate for the Vapor Recovery Unit (VRU01) shall be limited to keep total HAP emissions below 24.9 tons/yr and keep individual HAP emissions below 9.9 tons/yr which is less than applicability thresholds of 40 CFR 63, Subpart R.

VRUTK will be operated at a maximum emission rate of 3 mg/L with negative pressure loading (vac assist, VACTK) to eliminate fugitive emissions from loading.

This condition is applicable for 1-RACK1, RGS, FTV.

Work Practice	Process Material		Reference Test Method
Type	Code	Description	
N/A	N/A	N/A	Method25A or 25B, Method 21, Method 2A

Parameter		Manufacturer Name/Model No.
Code	Description	
0NY502000	40 CFR 60-63 - Total Organic Compounds (TOC)	N/A

Limit		Limit Units	
Upper	Lower	Code	Description
3	N/A	318	milligrams per liter

Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description
60	Maximum - Not to Exceed Stated Value - See Monitoring Description	14	As Required - See Permit Monitoring Description	15	Annually (Calendar)

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Section III - Facility Information

Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
40	CFR	63	BBBBBB	11092	b				

☒ Applicable Federal Requirement
☐ State Only Requirement
☐ Capping

CAS No.	Contaminant Name
0NY998-00-0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☒ Monitoring of Process or Control Device Parameters as a Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

The terminal will use a VRU with a Continuous Emissions Monitoring System (CEMS) capable of measuring organic compound concentrations per 40 CFR 63.11092(b)(1)(i)(A). The average hydrocarbon outlet percent will be monitored to ensure it does not exceed a six hour average limit of 0.3 vol% propane (3000 ppm), which corresponds to the permitted limit of 3 mg/L. The averaging time is a six hour rolling average. In the event of CEMS downtime, alternative monitoring parameters will be observed in accordance with 40 CFR 63.11092(b)(1)(i)(B).

Each calendar month the vapor collection system and vapor processing system shall be inspected during loading events for total organic compounds liquid or vapor leaks. For purposes of this paragraph, sight, sound or smell are acceptable inspection/detection methods. Each detection of a leak shall be recorded and the source of the leak repaired.

This condition applies to VRU01

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
N/A	N/A	N/A	N/A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
N/A	N/A	N/A	N/A

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
30	6-hour rolling average	03	Daily	14	Semi-Annually (Calendar)

Continuation Sheet ____ of ____

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Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
40	CFR	64							

☒ Applicable Federal Requirement
☐ State Only Requirement
☐ Capping

CAS No.	Contaminant Name
0NY998-00-0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☒ Monitoring of Process or Control Device Parameters as a Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

A CEMS is used as the continuous monitoring parameter for CAM. Daily drift checks are performed automatically by the system. Daily drift checks are used to evaluate if the CEM needs to be calibrated.

The following parameters will be monitored when the CEMS is not operational:
INDICATOR 1: CARBON BED TEMPERATURE VRU MEASUREMENT APPROACH:
Bed temperature measured continuously via probe inserted directly in bed. Signal from probe directed to external thermocouple.
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 is to be taken.
DATA REPRESENTATIVENESS: Temperature probe placed directly in carbon bed. Rise in bed temperature indicative of poor performance or reduced VOC adsorption capacity.
QA/QA PRACTICES and CRITERIA: Thermometer temperature calibrations performed annually. Accuracy of the thermometer will be determined by comparing readings between multiple thermometers installed in the carbon beds.

Compliance testing of VRU emissions on a once per permit term cycle. Compliance testing will include demonstration that VOC emissions are below the permit limit
MONITORING FREQUENCY and DATA COLLECTION PROCEDURE: Readings are to be collected on a daily basis by direct reading of carbon bed temperature gauge. Readings are recorded as the nearest 5 degree F increment (+/-5 F)

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
N/A	N/A	N/A	N/A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
N/A	N/A	N/A	N/A

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
30	6-hour rolling average	14	AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION	14	SEMI-ANNUALLY (Calendar)

DEC ID											
1	-	2	8	2	0	-	0	0	9	4	7

Section III - Facility Information

Facility Description (continuation)

Duration of reading should be at least one loading cycle of each carbon bed, approximately 30 minutes. Data is recorded and reported on a daily basis when the CEMS is not operational. 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.
INDICATOR 2: CARBON REGENERATION CYCLE VACUUM PRESSURE MEASUREMENT APPROACH:
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.
INDICATOR RANGE: Vacuum during regeneration > 25" Hg sustained. If the vacuum is not sustained for an entire cycle, corrective action is warranted
DATA REPRESENTATIVENESS: Pressure or vacuum gauge placed in line such that it measures vacuum placed on carbon bed directly. If vacuum placed on carbon bed is not adequate that VOC may not be recovered and carbon bed not adequately regenerated. If not regenerated properly be will have reduced capacity for sorption of volatile organics.

Facility staff are to conduct daily checks to verify operational status of VRU and adherence to system performance criteria.

MONITORING FREQUENCY and DATA COLLECTION PROCEDURE:
Readings collected on a daily basis by direct reading of vacuum gauge when the CEMS is not operational. 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 inches Hg, 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.

A monitoring report must be submitted semiannually which summarizes the number, duration, and cause of exceedances and corrective actions taken. These records are to be maintained for a period of five years.

This condition is applicable for VRU01

New York State Department of Environmental Conservation
Air Permit Application Form

DEC ID
1-2820-00947

Section III - Facility Information

Facility Compliance Certification (continuation)									
Rule Citation									
Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
6	NYCRR	201	7	1	a				

		CAS No.	Contaminant Name
☒ Applicable Federal Requirement ☐ State Only Requirement	☒ Capping	0NY988-00-0 and 0NY100-00-0	VOC and Total HAP

Monitoring Information

- ☐ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☐ Monitoring of Process or Control Device Parameters as a Surrogate
- ☒ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

The emissions rate for the Vapor Recovery Unit (VRU02) shall be limited to keep total HAP emissions below 24.9 tons/yr and keep individual HAP emissions below 9.9 tons/yr which is less than the applicability thresholds of 40 CFR 63, Subpart R.

VRU02 will be operated at a maximum emission rate of 10 mg/L with negative pressure loading (vac assist, VACTK) to eliminate fugitive emissions from loading.

This condition is applicable for 1-RACK1, RGB, FTV

Work Practice	Process Material		Reference Test Method
Type	Code	Description	
N/A	N/A	N/A	Method 25A or 25B, Method 21, Method 2A

Parameter		Manufacturer Name/Model No.
Code	Description	
0NY502000	40 CFR 60-63 - Total Organic Compounds (TOC)	N/A

Limit		Limit Units	
Upper	Lower	Code	Description
10	N/A	318	milligrams per liter

Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description
60	Maximum - Not to Exceed Stated Value - See Monitoring Description	14	As Required - See Permit Monitoring Description	15	Annually (Calendar)

Continuation Sheet ____ of ____

New York State Department of Environmental Conservation
Air Permit Application Form

New York State of Opportunity | Department of Environmental Conservation

DEC ID
1-2820-00947

Section III - Facility Information

Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
40	CFR	63	BBBBBB	11092	b				

		CAS No.	Contaminant Name
☒ Applicable Federal Requirement ☐ State Only Requirement	☐ Capping	0NY998-00-0	VOC

Monitoring Information

- ☐ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☒ Monitoring of Process or Control Device Parameters as a Surrogate
- ☐ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

The terminal will use a backup VRU, and will observe alternative monitoring parameters in accordance with 40 CFR 63.11092(b)(1)(i)(B).

Each calendar month the vapor collection system and vapor processing system shall be inspected during loading events for total organic compounds liquid or vapor leaks. For purposes of this paragraph, sight, sound or smell are acceptable inspection/detection methods. Each detection of a leak shall be recorded and the source of the leak repaired.

This condition applies to VRU02

Work Practice	Process Material		Reference Test Method
Type	Code	Description	
N/A	N/A	N/A	N/A

Parameter		Manufacturer Name/Model No.
Code	Description	
N/A	N/A	N/A

Limit		Limit Units	
Upper	Lower	Code	Description
N/A	N/A	N/A	N/A

Averaging Method		Monitoring Frequency		Reporting Requirements	
Code	Description	Code	Description	Code	Description
30	6-hour rolling average	03	Daily	14	Semi-Annually (Calendar)

Continuation Sheet ____ of ____

DEC ID
1-2820-00947

Section III - Facility Information

Facility Compliance Certification (continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Subparagraph	Clause	Subclause
40	CFR	64							

☒ Applicable Federal Requirement
☐ State Only Requirement
☐ Capping

CAS No.	Contaminant Name
0NY998-00-0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☒ Monitoring of Process or Control Device Parameters as a Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

The following parameters of the backup VRU will be monitored:
INDICATOR 1: CARBON BED TEMPERATURE VRU MEASUREMENT APPROACH:
Bed temperature measured continuously via probe inserted directly in bed. Signal from probe directed to external thermocouple.
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 is to be taken.
DATA REPRESENTATIVENESS: Temperature probe placed directly in carbon bed. Rise in bed temperature indicative of poor performance or reduced VOC adsorption capacity.
QA/QA PRACTICES and CRITERIA: Thermometer temperature calibrations performed annually. Accuracy of the thermometer will be determined by comparing readings between multiple thermometers installed in the carbon beds.

Compliance testing of VRU emissions on a once per permit term cycle. Compliance testing will include demonstration that VOC emissions are below the permit limit
MONITORING FREQUENCY and DATA COLLECTION PROCEDURE: Readings are to be collected on a daily basis by direct reading of carbon bed temperature gauge. Readings are recorded as the nearest 5 degree F increment (+/-5 F)

(continued)

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
N/A	N/A	N/A	N/A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
N/A	N/A	N/A

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
N/A	N/A	N/A	N/A

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
30	6-hour rolling average	14	AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION	14	SEMI-ANNUALLY (Calendar)

Continuation Sheet ____ of ____

DEC ID											
1	-	2	8	2	0	-	0	0	9	4	7

Section III - Facility Information

Facility Description (continuation)

Duration of reading should be at least one loading cycle of each carbon bed, approximately 30 minutes. Data is 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.
INDICATOR 2: CARBON REGENERATION CYCLE VACUUM PRESSURE MEASUREMENT APPROACH:
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.
INDICATOR RANGE: Vacuum during regeneration > 25" Hg sustained. If the vacuum is not sustained for an entire cycle, corrective action is warranted
DATA REPRESENTATIVENESS: Pressure or vacuum gauge placed in line such that it measures vacuum placed on carbon bed directly. If vacuum placed on carbon bed is not adequate that VOC may not be recovered and carbon bed not adequately regenerated. If not regenerated properly be will have reduced capacity for sorption of volatile organics.

Facility staff are to conduct daily checks to verify operational status of VRU and adherence to system performance criteria.

MONITORING FREQUENCY and DATA COLLECTION PROCEDURE:
Readings collected on a daily basis by direct reading of vacuum gauge. 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 inches Hg, 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.

A monitoring report must be submitted semiannually which summarizes the number, duration, and cause of exceedances and corrective actions taken. These records are to be maintained for a period of five years.

This condition is applicable for VRU02

New York State Department of Environmental Conservation
Air Permit Application Form

DEC ID
1-2820-00947

Section IV - Emission Unit Information

Emission Unit Description (continuation)	
Emission Unit	1-FUGTV

Facility wide equipment fugitive emissions

New York State Department of Environmental Conservation
Air Permit Application Form

DEC ID
1 - 2 8 2 0 - 0 0 9 4 7

Section IV - Emission Unit Information

Emission Point Information (continuation)						
Emission Unit	1 - F U G T V				Emission Point	E P F U G
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
Emission Unit	-				Emission Point	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
Emission Unit	-				Emission Point	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
Emission Unit	-				Emission Point	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
Emission Unit	-				Emission Point	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal

Continuation Sheet ____ of ____

New York State Department of Environmental Conservation
Air Permit Application Form

DEC ID
1-2820-00947

Section IV - Emission Unit Information

Emission Source/Control (continuation)

Emission Unit: 1-FUGTV

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.
FUGTV							

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

New York State Department of Environmental Conservation
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Section IV - Emission Unit Information

Process Information (continuation)

Emission Unit	1-FUGTV	Process	FG1

Description

Miscellaneous fugitive HAP and VOC emissions from valves, pumps, and miscellaneous equipment leakage.

Source Classification Code (SCC)	Total Throughput		Throughput Quantity Units	
	Quantity/Hr	Quantity/Yr	Code	Description
4-04-001-51	N/A	N/A	N/A	N/A

	Operating Schedule		Building	Floor/Location
☐ Confidential ☐ Operating at Maximum Capacity	Hrs/Day	Days/Yr		
	N/A	N/A	N/A	N/A

Emission Point Identifier(s)

EPFUG						

Emission Source/Control Identifier(s)

FUGTV - Source						

Emission Unit	-	Process	

Description

Source Classification Code (SCC)	Total Throughput		Throughput Quantity Units	
	Quantity/Hr	Quantity/Yr	Code	Description

	Operating Schedule		Building	Floor/Location
☐ Confidential ☐ Operating at Maximum Capacity	Hrs/Day	Days/Yr		

Emission Point Identifier(s)

Emission Source/Control Identifier(s)

New York State Department of Environmental Conservation
Air Permit Application Form

DEC ID
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Section IV - Emission Unit Information

Emission Source/Control (continuation)

Emission Unit: 1-RACK1

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.
RACK1	K	N/A	N/A	N/A	N/A	Vac Assist	VACTK

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.
RACK1	K	N/A	N/A	N/A	47	Vapor Recovery System	VRU01

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.
RACK1	K	N/A	N/A	N/A	47	Vapor Recovery System	VRU02

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

Emission Source ID	Emission Source Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description

New York State Department of Environmental Conservation
Air Permit Application Form

New York State of Opportunity | Department of Environmental Conservation

DEC ID
1-2820-00947

Section IV - Emission Unit Information

Emission Point Information (continuation)

Emission Unit	1-RACK1			Emission Point	TRK01	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
N/A	16	N/A	12	N/A	N/A	N/A
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Emission Unit	1-RACK1			Emission Point	TRK02	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
N/A	N/A	605.033	4498.923	N/A	N/A	N/A

Emission Unit	1-RACK1			Emission Point	TRK03	
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
N/A	N/A	N/A	N/A	N/A	N/A	N/A
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Emission Unit	-			Emission Point		
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal

Emission Unit	-			Emission Point		
Ground Elevation (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (km)	NYTM (N) (km)	Building	Distance to Property Line (ft)	Date of Removal

Continuation Sheet ____ of ____

New York State Department of Environmental Conservation
Facility DEC ID: 1282000947

PERMIT
Under the Environmental Conservation Law (ECL)

IDENTIFICATION INFORMATION

Permit Type: Air Title V Facility
Permit ID: 1-2820-00947/00002
Mod 0 Effective Date: 01/17/2012 Expiration Date: 01/16/2017

Mod 1 Effective Date: 08/27/2013 Expiration Date: 01/16/2017

Permit Issued To: GLOBAL COMPANIES LLC
800 SOUTH ST
WALTHAM, MA 02453

Contact: HANK M MEYERHOEFER
GLOBAL COMPANIES LLC - INWOOD TERMINAL
464 DOUGHTY BLVD
INWOOD, NY 11096
(516) 371-8511

Facility: GLOBAL COMPANIES LLC - INWOOD TERMINAL
464 DOUGHTY BLVD
INWOOD, NY 11096

five (5)

Description:
The facility is classified as a gasoline/distillate loading terminal consisting of ~~six (6)~~ permitted storage tanks along with other storage tanks containing gasoline additives and ~~heating oil/diesel~~. One (1) loading rack with 6 bays is located onsite. Gasoline loading is controlled with a vapor recovery unit.

distillate (including biodiesel and renewable diesel)

with vacuum assist

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, the General Conditions specified and any Special Conditions included as part of this permit.

Permit Administrator: SUSAN ACKERMAN
NYSDEC - SUNY @ STONY BROOK
50 CIRCLE RD
STONY BROOK, NY 11790-3409

Authorized Signature: ________________________________ Date: ___ / ___ / _____

Notification of Other State Permittee Obligations

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification

The permittee expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the compliance permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in any compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits, or actions naming the DEC and arising under article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit

The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

Item C: Permittee Responsible for Obtaining Other Required Permits

The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights

This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

LIST OF CONDITIONS

DEC GENERAL CONDITIONS
****** General Provisions ******
For the purpose of your Title V permit, the following section contains state-only enforceable terms and conditions.
GENERAL CONDITIONS - Apply to ALL Authorized Permits.

Condition 1: Facility Inspection by the Department
Applicable State Requirement: ECL 19-0305

Item 1.1:
The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71-0301 and SAPA 401(3).

Item 1.2:
The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

Item 1.3:
A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

Condition 2: Relationship of this Permit to Other Department Orders and Determinations
Applicable State Requirement: ECL 3-0301 (2) (m)

Item 2.1:
Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

Condition 3: Applications for permit renewals, modifications and transfers
Applicable State Requirement: 6 NYCRR 621.11

Item 3.1:
The permittee must submit a separate written application to the Department for renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing.

Item 3.2:
The permittee must submit a renewal application at least 180 days before expiration of permits for Title V Facility Permits, or at least 30 days before expiration of permits for State Facility Permits.

Item 3.3:
Permits are transferrable with the approval of the department unless specifically prohibited by the statute, regulation or another permit condition. Applications for permit transfer should be

Condition 4: Permit modifications, suspensions or revocations by the Department
Applicable State Requirement: 6 NYCRR 621.13

Item 4.1:
The Department reserves the right to exercise all available authority to modify, suspend, or revoke this permit in accordance with 6NYCRR Part 621. The grounds for modification, suspension or revocation include:

a) materially false or inaccurate statements in the permit application or supporting papers;
b) failure by the permittee to comply with any terms or conditions of the permit;
c) exceeding the scope of the project as described in the permit application;
d) newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;
e) noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

****** Facility Level ******

Condition 5: Submission of application for permit modification or renewal - REGION 1 HEADQUARTERS
Applicable State Requirement: 6 NYCRR 621.6 (a)

Item 5.1:
Applications for permit modification or renewal are to be submitted to:

NYSDEC Regional Permit Administrator
Region 1 Headquarters
Division of Environmental Permits
Stony Brook University
50 Circle Road
Stony Brook, NY 11790-3409
(631) 444-0365

Permit Under the Environmental Conservation Law (ECL)

ARTICLE 19: AIR POLLUTION CONTROL - TITLE V PERMIT

IDENTIFICATION INFORMATION

Permit Issued To:GLOBAL COMPANIES LLC
800 SOUTH ST
WALTHAM, MA 02453

Facility: GLOBAL COMPANIES LLC - INWOOD TERMINAL
464 DOUGHTY BLVD
INWOOD, NY 11096

Authorized Activity By Standard Industrial Classification Code:
5171 - PETROLEUM BULK STATIONS & TERMINALS

Mod 0 Permit Effective Date: 01/17/2012 Permit Expiration Date: 01/16/2017

Mod 1 Permit Effective Date: 08/27/2013 Permit Expiration Date: 01/16/2017

LIST OF CONDITIONS

FEDERALLY ENFORCEABLE CONDITIONS
Facility Level

Emission Unit Level

1-26 6 NYCRR 201-7.1 (a): Emission Unit Permissible Emissions

EU=1-RACK1
48 40CFR 63.11088, Subpart BBBBBB: Compliance Certification
49 40CFR 63.11092(a), Subpart BBBBBB: Compliance Certification

EU=1-RACK1,Proc=RDS
50 6 NYCRR 212.10 (c) (1): RACT analysis exemption for major facilities in the New York City Metropolitan Area and Lower Orange County Metropolitan Area

EU=1-RACK1,Proc=RDS,ES=RACK1
1-27 6 NYCRR 212.10 (c) (1): RACT analysis exemption for major facilities in the New York City Metropolitan Area and Lower Orange County Metropolitan Area

EU=1-RACK1,Proc=RGS
*1-28 6 NYCRR 201-7.1 (a): Capping Monitoring Condition

EU=1-RACK1,Proc=RGS,ES=RACK1
51 40CFR 60.505(b), NSPS Subpart XX: Compliance Certification
52 40CFR 60.505(c), NSPS Subpart XX: Compliance Certification
53 40CFR 60.505(f), NSPS Subpart XX: Compliance Certification

EU=1-RACK1,Proc=RGS,ES=~~VPORS~~ VRU01
54 40 CFR Part 64: Compliance Certification

EU=1-RACK1,EP=~~00001~~,Proc=RDS
*1-29 6 NYCRR 201-7.1 (a): Capping Monitoring Condition

TRK01

EU=1-RACK1,EP=~~00001~~,Proc=RGS
*1-30 6 NYCRR 201-7.1 (a): Capping Monitoring Condition

EU=1-TANKS
1-31 6 NYCRR 229.3 (e) (1): VOL fixed roof storage tank requirements
55 40CFR 63.11092(e)(1), Subpart BBBBBB: Compliance Certification

EU=1-TANKS,Proc=GAS,ES=TK010
56 40CFR 60.112b(a)(1), NSPS Subpart Kb: VOC standard for volatile organic liquid storage vessels equipped with a fixed roof in combination with a internal floating roof

EU=1-TANKS,Proc=VOL,ES=TK010
57 40CFR 60.112b(a)(1), NSPS Subpart Kb: VOC standard for volatile organic liquid storage vessels equipped with a fixed roof in combination with a internal floating roof

STATE ONLY ENFORCEABLE CONDITIONS
Facility Level
58 ECL 19-0301: Contaminant List
1-32 6 NYCRR 201-1.4: Malfunctions and start-up/shutdown activities
59 6 NYCRR 201-1.4: Unavoidable noncompliance and violations

NOTE: * preceding the condition number indicates capping.

FEDERALLY ENFORCEABLE CONDITIONS
****** Facility Level ******

NOTIFICATION OF GENERAL PERMITTEE OBLIGATIONS
The items listed below are not subject to the annual compliance certification requirements under Title V. Permittees may also have other obligations under regulations of general applicability.

Item A: **Emergency Defense - 6 NYCRR 201-1.5**

An emergency, as defined by subpart 201-2, constitutes an affirmative defense to penalties sought in an enforcement action brought by the Department for noncompliance with emissions limitations or permit conditions for all facilities in New York State.

(a) The affirmative defense of emergency shall be demonstrated through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An emergency occurred and that the facility owner or operator can identify the cause(s) of the emergency;
(2) The equipment at the permitted facility causing the emergency was at the time being properly operated and maintained;
(3) During the period of the emergency the facility owner or operator took all reasonable steps to minimize levels of emissions that exceeded the emission standards, or other requirements in the permit; and
(4) The facility owner or operator notified the Department within two working days after the event occurred. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.

(b) In any enforcement proceeding, the facility owner or operator seeking to establish the occurrence of an emergency has the burden of proof.

(c) This provision is in addition to any emergency or upset provision contained in any applicable requirement.

Item B: **Public Access to Recordkeeping for Title V Facilities - 6 NYCRR 201-1.10 (b)**
The Department will make available to the public any permit application, compliance plan, permit, and monitoring and compliance certification report pursuant to Section 503(e) of the Act, except for information entitled to confidential treatment pursuant to 6 NYCRR Part 616 - Public Access to records and Section 114(c) of the Act.

Item C: **Timely Application for the Renewal of Title V Permits - 6 NYCRR 201-6.2 (a) (4)**
Owners and/or operators of facilities having an issued Title V permit shall submit a complete application at least 180 days, but not more than eighteen months, prior to the date of permit expiration for permit renewal purposes.

Item D: **Certification by a Responsible Official - 6 NYCRR 201-6.2 (d) (12)**
Any application, form, report or compliance certification required to be submitted pursuant to the federally enforceable portions of this permit shall contain a certification of truth, accuracy and completeness by a responsible official. This certification shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Item E: **Requirement to Comply With All Conditions - 6 NYCRR 201-6.4 (a) (2)**
The permittee must comply with all conditions of the Title V facility permit. Any permit non-compliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

Item F: **Permit Revocation, Modification, Reopening, Reissuance or Termination, and Associated Information Submission Requirements - 6 NYCRR 201-6.4 (a) (3)**
This permit may be modified, revoked, reopened and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Item G: **Cessation or Reduction of Permitted Activity Not a Defense - 6 NYCRR 201-6.4 (a) (5)**
It shall not be a defense for a permittee in an enforcement action to claim that a cessation or reduction in the permitted activity would have been necessary in order to maintain compliance with the conditions of this permit.

Item H: **Property Rights - 6 NYCRR 201-6.4 (a) (6)**

This permit does not convey any property rights of any sort or any exclusive privilege.

Item I: Severability - 6 NYCRR 201-6.4 (a) (9)

If any provisions, parts or conditions of this permit are found to be invalid or are the subject of a challenge, the remainder of this permit shall continue to be valid.

Item J: Permit Shield - 6 NYCRR 201-6.4 (g)

All permittees granted a Title V facility permit shall be covered under the protection of a permit shield, except as provided under 6 NYCRR Subpart 201-6. Compliance with the conditions of the permit shall be deemed compliance with any applicable requirements as of the date of permit issuance, provided that such applicable requirements are included and are specifically identified in the permit, or the Department, in acting on the permit application or revision, determines in writing that other requirements specifically identified are not applicable to the major stationary source, and the permit includes the determination or a concise summary thereof. Nothing herein shall preclude the Department from revising or revoking the permit pursuant to 6 NYCRR Part 621 or from exercising its summary abatement authority. Nothing in this permit shall alter or affect the following:

i. The ability of the Department to seek to bring suit on behalf of the State of New York, or the Administrator to seek to bring suit on behalf of the United States, to immediately restrain any person causing or contributing to pollution presenting an imminent and substantial endangerment to public health, welfare or the environment to stop the emission of air pollutants causing or contributing to such pollution;

ii. The liability of a permittee of the Title V facility for any violation of applicable requirements prior to or at the time of permit issuance;

iii. The applicable requirements of Title IV of the Act;

iv. The ability of the Department or the Administrator to obtain information from the permittee concerning the ability to enter, inspect and monitor the facility.

Item K: Reopening for Cause - 6 NYCRR 201-6.4 (i)

This Title V permit shall be reopened and revised under any of the following circumstances:

i. If additional applicable requirements under the Act become applicable where this permit's remaining term is three or more years, a reopening shall be completed not later than 18 months after promulgation of the applicable requirement. No such reopening is required if the effective date of the requirement is later than the date on which this permit is due to expire, unless the original permit or any of its terms and conditions has been extended by the Department pursuant to the provisions of Part 201-6.7 and Part 621.

ii. The Department or the Administrator determines that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit.

iii. The Department or the Administrator determines that the Title V permit must be revised or reopened to assure compliance with applicable requirements.

iv. If the permitted facility is an "affected source" subject to the requirements of Title IV of the Act, and additional requirements (including excess emissions requirements) become applicable. Upon approval by the Administrator, excess emissions offset plans shall be deemed to be incorporated into the permit.

Proceedings to reopen and issue Title V facility permits shall follow the same procedures as apply to initial permit issuance but shall affect only those parts of the permit for which cause to reopen exists.

Reopenings shall not be initiated before a notice of such intent is provided to the facility by the Department at least thirty days in advance of the date that the permit is to be reopened, except that the Department may provide a shorter time period in the case of an emergency.

Item L: Permit Exclusion - ECL 19-0305

The issuance of this permit by the Department and the receipt thereof by the Applicant does not and shall not be construed as barring, diminishing, adjudicating or in any way affecting any legal, administrative or equitable rights or claims, actions, suits, causes of action or demands whatsoever that the Department may have against the Applicant for violations based on facts and circumstances alleged to have occurred or existed prior to the effective date of this permit, including, but not limited to, any enforcement action authorized pursuant to the provisions of applicable federal law, the Environmental Conservation Law of the State of New York (ECL) and Chapter III of the Official Compilation of the Codes, Rules and Regulations of the State of New York

(NYCRR). The issuance of this permit also shall not in any way affect pending or future enforcement actions under the Clean Air Act brought by the United States or any person.

Item M: Federally Enforceable Requirements - 40 CFR 70.6 (b)
All terms and conditions in this permit required by the Act or any applicable requirement, including any provisions designed to limit a facility's potential to emit, are enforceable by the Administrator and citizens under the Act. The Department has, in this permit, specifically designated any terms and conditions that are not required under the Act or under any of its applicable requirements as being enforceable under only state regulations.

MANDATORY FEDERALLY ENFORCEABLE PERMIT CONDITIONS SUBJECT TO ANNUAL CERTIFICATIONS AT ALL TIMES

The following federally enforceable permit conditions are mandatory for all Title V permits and are subject to annual compliance certification requirements at all times.

Condition 1: Acceptable Ambient Air Quality
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 200.6

Item 1.1:
Notwithstanding the provisions of 6 NYCRR Chapter III, Subchapter A, no person shall allow or permit any air contamination source to emit air contaminants in quantities which alone or in combination with emissions from other air contamination sources would contravene any applicable ambient air quality standard and/or cause air pollution. In such cases where contravention occurs or may occur, the Commissioner shall specify the degree and/or method of emission control required.

Condition 1-1: Fees
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (a) (7)

Item 1-1.1:
The owner and/or operator of a stationary source shall pay fees to the Department consistent with the fee schedule authorized by ECL 72-0303.

Condition 1-2: Recordkeeping and Reporting of Compliance Monitoring
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (c)

Item 1-2.1:
The following information must be included in any required compliance monitoring records and reports:

(i) The date, place, and time of sampling or measurements;

(ii) The date(s) analyses were performed;

(iii)The company or entity that performed the analyses;

(iv) The analytical techniques or methods used including quality assurance and quality control procedures if required;

(v) The results of such analyses including quality assurance data where required; and

(vi) The operating conditions as existing at the time of sampling or measurement.

Any deviation from permit requirements must be clearly identified in all records and reports. Reports must be certified by a responsible official, consistent with Section 201-6.2 of Part 201.

Condition 1-3: Records of Monitoring, Sampling, and Measurement
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (c) (2)

Item 1-3.1:
Compliance monitoring and recordkeeping shall be conducted according to the terms and conditions contained in this permit and shall follow all quality assurance requirements found in applicable regulations. Records of all monitoring data and support information must be retained for a period of at least 5 years from the date of the monitoring, sampling, measurement, report, or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by the permit.

Condition 1-4: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (c) (3) (ii)

Item 1-4.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-4.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
To meet the requirements of this facility permit with respect to reporting, the permittee must:

Submit reports of any required monitoring at a minimum frequency of every 6 months, based on a calendar year reporting schedule. These reports shall be submitted to the Department within 30 days after the end of a reporting period. All instances of deviations from permit requirements must be clearly identified in such reports. All required reports must be certified by the responsible official for this facility.

Notify the Department and report permit deviations and incidences of noncompliance stating the probable cause of such deviations, and any corrective actions or preventive measures taken. Where the underlying applicable requirement contains a definition of prompt or otherwise specifies a time frame for reporting deviations, that definition or time frame shall govern. Where the underlying applicable requirement fails to address the time frame for reporting deviations, reports of deviations shall be submitted to the permitting authority based on the following schedule:

(1) For emissions of a hazardous air pollutant (as identified in an applicable regulation) that continue for more than an hour in excess of permit requirements, the report must be made within 24 hours of the occurrence.

(2) For emissions of any regulated air pollutant, excluding those listed in paragraph (1) of this section, that continue for more than two hours in excess of permit requirements, the report must be made within 48 hours.

(3) For all other deviations from permit requirements, the report shall be contained in the 6 month monitoring report required above.

(4) This permit may contain a more stringent reporting requirement than required by paragraphs (1), (2) or (3) above. If more stringent reporting requirements have been placed in this permit or exist in applicable requirements that apply to this facility, the more stringent reporting requirement shall apply.

If above paragraphs (1) or (2) are met, the source must notify the permitting authority by telephone during normal business hours at the Regional Office of jurisdiction for this permit, attention Regional Air Pollution Control Engineer (RAPCE) according to the timetable listed in paragraphs (1) and (2) of this section. For deviations and incidences that must be reported outside of normal business hours, on weekends, or holidays, the DEC Spill

Hotline phone number at 1-800-457-7362 shall be used. A written notice, certified by a responsible official consistent with 6 NYCRR Part 201-6.2(d)(12), must be submitted within 10 working days of an occurrence for deviations reported under (1) and (2). All deviations reported under paragraphs (1) and (2) of this section must also be identified in the 6 month monitoring report required above.

The provisions of 6 NYCRR 201-1.4 shall apply if the permittee seeks to have a violation excused unless otherwise limited by regulation. In order to have a violation of a federal regulation (such as a new source performance standard or national emissions standard for hazardous air pollutants) excused, the specific federal regulation must provide for an affirmative defense during start-up, shutdowns, malfunctions or upsets. Notwithstanding any recordkeeping and reporting requirements in 6 NYCRR 201-1.4, reports of any deviations shall not be on a less frequent basis than the reporting periods described in paragraphs (1) and (4) above.

In the case of any condition contained in this permit with a reporting requirement of "Upon request by regulatory agency" the permittee shall include in the semiannual report, a statement for each such condition that the monitoring or recordkeeping was performed as required or requested and a listing of all instances of deviations from these requirements.

In the case of any emission testing performed during the previous six month reporting period, either due to a request by the Department, EPA, or a regulatory requirement, the permittee shall include in the semiannual report a summary of the testing results and shall indicate whether or not the Department or EPA has approved the results.

All semiannual reports shall be submitted to the Administrator (or his or her representative) as well as two copies to the Department (one copy to the regional air pollution control engineer (RAPCE) in the regional office and one copy to the Bureau of Quality Assurance (BQA) in the DEC central office). Mailing addresses for the above referenced persons are contained in the monitoring condition for 6 NYCRR Part 201-6.4(e), contained elsewhere in this permit.

Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 12 calendar month(s).

Condition 1-5: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (e)

Item 1-5.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-5.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

Requirements for compliance certifications with terms and conditions contained in this facility permit include the following:

i. Compliance certifications shall contain:
- the identification of each term or condition of the permit that is the basis of the certification;
- the compliance status;
- whether compliance was continuous or intermittent;
- the method(s) used for determining the compliance status of the facility, currently and over the reporting period consistent with the monitoring and related recordkeeping and reporting requirements of this permit;
- such other facts as the Department may require to determine the compliance status of the facility as specified in any special permit terms or conditions; and
- such additional requirements as may be specified elsewhere in this permit related to compliance certification.

ii. The responsible official must include in the annual certification report all terms and conditions contained in this permit which are identified as being subject to certification, including emission limitations, standards, or work practices. That is, the provisions labeled herein as "Compliance Certification" are not the only provisions of this permit for which an annual certification is required.

iii. Compliance certifications shall be submitted annually. Certification reports are due 30 days after the anniversary date of four consecutive calendar quarters. The first report is due 30 days after the calendar quarter that occurs just prior to the permit anniversary date, unless another quarter has been acceptable by the Department.

iv. All compliance certifications shall be submitted to the Administrator (or his or her representative) as well as two copies to the Department (one copy to the regional air pollution control engineer (RAPCE) in the regional office and one copy to the Bureau of Quality Assurance (BQA) in the DEC central office). Please send annual compliance certifications to Chief of the Stationary Source Compliance Section, the Region 2 EPA representative for the Administrator, at the following address:

USEPA Region 2
Air Compliance Branch
290 Broadway
New York, NY 10007-1866

The address for the RAPCE is as follows:

NYSDEC- Region 1 Headquarters
Stony Brook University
50 Circle Road
Stony Brook, NY 11790-3409

The address for the BQA is as follows:

NYSDEC
Bureau of Quality Assurance
625 Broadway
Albany, NY 12233-3258

Monitoring Frequency: ANNUALLY
Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2013.
Subsequent reports are due on the same day each year

Condition 6: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 202-2.1

Item 6.1:
The Compliance Certification activity will be performed for the Facility.

Item 6.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

Monitoring Frequency: ANNUALLY
Reporting Requirements: ANNUALLY (CALENDAR)
Reports due by April 15th for previous calendar year

Condition 7: Recordkeeping requirements
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 202-2.5

Item 7.1:
(a) The following records shall be maintained for at least five years:

(1) a copy of each emission statement submitted to the department; and

(2) records indicating how the information submitted in the emission statement was determined, including any calculations, data, measurements, and estimates used.

(b) These records shall be made available at the facility to the representatives of the department upon request during normal business hours.

Condition 8: Open Fires - Prohibitions
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 215.2

Item 8.1:
Except as allowed by Title 6 NYCRR Section 215.3, no person shall burn, cause, suffer, allow or permit the burning of any materials in an open fire.

Item 8.2
Per Section 215.3, burning in an open fire, provided it is not contrary to other law or regulation, will be allowed as follows:
(a) On-site burning in any town with a total population less than 20,000 of downed limbs and branches (including branches with attached leaves or needles) less than six inches in diameter and eight feet in length between May 15th and the following March 15th. For the purposes of this subdivision, the total population of a town shall include the population of any village or portion thereof located within the town. However, this subdivision shall not be construed to allow burning within any village.
(b) Barbecue grills, maple sugar arches and similar outdoor cooking devices when actually used for cooking or processing food.
(c) Small fires used for cooking and camp fires provided that only charcoal or untreated wood is used as fuel and the fire is not left unattended until extinguished.
(d) On-site burning of agricultural wastes as part of a valid agricultural operation on contiguous agricultural lands larger than five acres actively devoted to agricultural or horticultural use, provided such waste is actually grown or generated on those lands and such waste is capable of being fully burned within a 24-hour period.
(e) The use of liquid petroleum fueled smudge pots to prevent frost damage to crops.
(f) Ceremonial or celebratory bonfires where not otherwise prohibited by law, provided that only untreated wood or other agricultural products are used as fuel and the fire is not left unattended until extinguished.
(g) Small fires that are used to dispose of a flag or religious item, and small fires or other smoke producing process where not otherwise prohibited by law that are used in connection with a religious ceremony.
(h) Burning on an emergency basis of explosive or other dangerous or contraband materials by police or other public safety organization.

(i) Prescribed burns performed according to Part 194 of this Title.
(j) Fire training, including firefighting, fire rescue, and fire/arson investigation training, performed under applicable rules and guidelines of the New York State Department of State's Office of Fire Prevention and Control. For fire training performed on acquired structures, the structures must be emptied and stripped of any material that is toxic, hazardous or likely to emit toxic smoke (such as asbestos, asphalt shingles and vinyl siding or other vinyl products) prior to burning and must be at least 300 feet from other occupied structures. No more than one structure per lot or within a 300 foot radius (whichever is bigger) may be burned in a training exercise.
(k) Individual open fires as approved by the Director of the Division of Air Resources as may be required in response to an outbreak of a plant or animal disease upon request by the commissioner of the Department of Agriculture and Markets, or for the destruction of invasive plant and insect species.
(l) Individual open fires that are otherwise authorized under the environmental conservation law, or by rule or regulation of the Department.

MANDATORY FEDERALLY ENFORCEABLE PERMIT CONDITIONS SUBJECT TO ANNUAL CERTIFICATIONS ONLY IF APPLICABLE

The following federally enforceable permit conditions are mandatory for all Title V permits and are subject to annual compliance certification requirements only if effectuated during the reporting period. [NOTE: The corresponding annual compliance certification for those conditions not effectuated during the reporting period shall be specified as "not applicable".]

Condition 9: Maintenance of Equipment
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 200.7

Item 9.1:
Any person who owns or operates an air contamination source which is equipped with an emission control device shall operate such device and keep it in a satisfactory state of maintenance and repair in accordance with ordinary and necessary practices, standards and procedures, inclusive of manufacturer's specifications, required to operate such device effectively.

Condition 1-6: Recycling and Salvage
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-1.7

Item 1-6.1:
Where practical, the owner or operator of an air contamination source shall recycle or salvage air contaminants collected in an air cleaning device according to the requirements of the ECL.

Condition 11: Prohibition of Reintroduction of Collected Contaminants to the air
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-1.8

Item 11.1:
No person shall unnecessarily remove, handle or cause to be handled, collected air contaminants from an air cleaning device for recycling, salvage or disposal in a manner that would reintroduce them to the outdoor atmosphere.

Condition 1-7: Exempt Sources - Proof of Eligibility
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-3.2 (a)

Item 1-7.1:
The owner or operator of an emission source or activity that is listed as being exempt may be required to certify that it is operated within the specific criteria described in this Subpart. The owner or operator of any such emission source or activity must maintain all records necessary for demonstrating compliance with this Subpart on-site for a period of five years, and make them available to representatives of the department upon request.

Condition 1-8: Trivial Sources - Proof of Eligibility
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-3.3 (a)

Item 1-8.1:
The owner or operator of an emission source or activity that is listed as being trivial in this Section may be required to certify that it is operated within the specific criteria described in this Subpart. The owner or operator of any such emission source or activity must maintain all required records on-site for a period of five years and make them available to representatives of the department upon request.

Condition 1-9: Requirement to Provide Information
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (a) (4)

Item 1-9.1:
The owner and/or operator shall furnish to the department, within a reasonable time, any information that the department may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the department copies of records required to be kept by the permit or, for information claimed to be confidential, the permittee may furnish such records directly to the administrator along with a claim of confidentiality, if the administrator initiated the request for information or otherwise has need of it.

Condition 1-10: Right to Inspect
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (a) (8)

Item 1-10.1:
The department or an authorized representative shall be allowed upon presentation of credentials and other documents as may be required by law to:

(i) enter upon the permittee's premises where a facility subject to the permitting requirements of this Subpart is located or emissions-related activity is conducted, or where records must be kept under the conditions of the permit;

(ii) have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;

(iii) inspect at reasonable times any emission sources, equipment (including monitoring and air pollution control equipment), practices, and operations regulated or required under the permit; and

(iv) sample or monitor at reasonable times substances or parameters for the purpose of assuring compliance with the permit or applicable requirements.

Condition 1-11: Off Permit Changes
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (f) (6)

Item 1-11.1:
No permit revision will be required for operating changes that contravene an express permit term, provided that such changes would not violate applicable requirements as defined under this Part or contravene federally enforceable monitoring (including test methods), recordkeeping, reporting, or compliance certification permit terms and conditions. Such changes may be made without requiring a permit revision, if the changes are not modifications under any provision of title I of the act and the changes do not exceed the emissions allowable under the permit (whether expressed therein as a rate of emissions or in terms of total emissions) provided that the facility provides the administrator and the department with written notification as required below in advance of the proposed changes within a minimum of seven days. The facility owner or operator, and the department shall attach each such notice to their copy of the relevant permit.

(i) For each such change, the written notification required above shall include a brief description of the change within the permitted facility, the date on which the change will occur, any change in emissions, and any permit term or condition that is no longer applicable as a result of the change.

(ii) The permit shield described in section 6 NYCRR 201-6.4 shall not apply to any change made pursuant to this paragraph.

Condition 18: Required Emissions Tests
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 202-1.1

Item 18.1:
For the purpose of ascertaining compliance or non-compliance with any air pollution control code, rule or regulation, the commissioner may require the person who owns such air

contamination source to submit an acceptable report of measured emissions within a stated time.

Condition 19: Accidental release provisions.
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40 CFR Part 68

Item 19.1:
If a chemical is listed in Tables 1,2,3 or 4 of 40 CFR §68.130 is present in a process in quantities greater than the threshold quantity listed in Tables 1,2,3 or 4, the following requirements will apply:

a) The owner or operator shall comply with the provisions of 40 CFR Part 68 and;

b) The owner or operator shall submit at the time of permit issuance (if not previously submitted) one of the following, if such quantities are present:

1) A compliance schedule for meeting the requirements of 40 CFR Part 68 by the date provided in 40 CFR §68.10(a) or,

2) A certification statement that the source is in compliance with all requirements of 40 CFR Part 68, including the registration and submission of the Risk Management Plan. Information should be submitted to:

Risk Management Plan Reporting Center
C/O CSC
8400 Corporate Dr
Carrollton, Md. 20785

Condition 20: Recycling and Emissions Reduction
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 82, Subpart F

Item 20.1:
The permittee shall comply with all applicable provisions of 40 CFR Part 82.

The following conditions are subject to annual compliance certification requirements for Title V permits only.

Condition 21: Emission Unit Definition
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR Subpart 201-6

Item 21.1(From Mod 1):
The facility is authorized to perform regulated processes under this permit for:

Emission Unit: 1-RACK1
Emission Unit Description:
Truck loading rack with 6 bays, 3 of which are used to load distillate, 1 of which is used to load gasoline and 2 of which are used to load distillate and/or gasoline.

Item 21.2(From Mod 1):
The facility is authorized to perform regulated processes under this permit for:
Emission Unit: 1-TANKS
Emission Unit Description:
Five (5) ~~Six (6)~~ storage tanks of different volumes containing gasoline or petroleum hydrocarbons ~~with a maximum vapor pressure of 12.0 psia @ 70 F. Each tank has a fixed roof with internal floating roof. Only 5 tanks will be in gasoline or vol service at a time.~~

ADD:
Emission Unit: 1-FUGTV
Emission Unit Description:
Facility wide equipment fugitive emissions.

Condition 1-12: Progress Reports Due Semiannually
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-6.4 (d) (4)

Item 1-12.1:
Progress reports consistent with an applicable schedule of compliance are to be submitted at least semiannually, or at a more frequent period if specified in the applicable requirement or by the department. Such progress reports shall contain the following:

(i) dates for achieving the activities, milestones, or compliance required in the schedule of compliance, and dates when such activities, milestones or compliance were achieved; and

(ii) an explanation of why any dates in the schedule of compliance were not or will not be met, and any preventive or corrective measures adopted.

Condition 1-13: Facility Permissible Emissions
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-13.1:
The sum of emissions from the emission units specified in this permit shall not equal or exceed the following
Potential To Emit (PTE) rate for each regulated contaminant:

CAS No: 000071-43-2 (From Mod 1) PTE: 19,800 pounds per year
Name: BENZENE

CAS No: 000091-20-3 (From Mod 1) PTE: 19,800 pounds per year
Name: NAPHTHALENE

~~CAS No: 000092-52-4 (From Mod 1) PTE: 19,800 pounds per year~~
~~Name: 1, 1 BIPHENYL~~

~~CAS No: 000095-48-7 (From Mod 1) PTE: 19,800 pounds per year~~
~~Name: 2-METHYL-PHENOL~~

CAS No: 000098-82-8 (From Mod 1) PTE: 19,800 pounds per year
Name: BENZENE, (1-METHYLETHYL)

CAS No: 000100-41-4 (From Mod 1) PTE: 19,800 pounds per year
Name: ETHYLBENZENE

CAS No: 001330-20-7
~~CAS No: 000108-38-3 (From Mod 1)~~ PTE: 19,800 pounds per year
~~Name: 1,3 DIMETHYL BENZENE~~
Name: XYLENE, M, O & P MIXT.

CAS No: 000108-88-3 (From Mod 1) PTE: 19,800 pounds per year
Name: TOLUENE

~~CAS No: 000108-95-2 (From Mod 1) PTE: 19,800 pounds per year~~
~~Name: PHENOL~~

CAS No: 000110-54-3 (From Mod 1) PTE: 19,800 pounds per year
Name: HEXANE

CAS No: 000540-84-1 (From Mod 1) PTE: 19,800 pounds per year
Name: PENTANE, 2,2,4-TRIMETHYL-

~~CAS No: 001634-04-4 (From Mod 1) PTE: 19,800 pounds per year~~
~~Name: METHYL TERTBUTYL ETHER~~

CAS No: 0NY100-00-0 (From Mod 1) PTE: 49,800 pounds per year
Name: TOTAL HAP

CAS No: 0NY998-00-0 (From Mod 1) PTE: ~~127,900 pounds~~ 91,580 pounds per year
Name: VOC

~~**Condition 1-14: Capping Monitoring Condition**~~
~~**Effective between the dates of 08/27/2013 and 01/16/2017**~~

~~**Applicable Federal Requirement:6 NYCRR 201-7.1 (a)**~~

Delete Condition

Item 1-14.1:
Under the authority of 6 NYCRR Part 201-7, this condition contains an emission cap for the purpose of limiting emissions from the facility, emission unit or process to avoid being subject to the following applicable requirement(s) that the facility, emission unit or process would otherwise be subject to:

6 NYCRR 231-6.2

Item 1-14.2:
Operation of this facility shall take place in accordance with the approved criteria, emission limits, terms, conditions and standards in this permit.

Item 1-14.3:
The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

Item 1-14.4:
On an annual basis, unless otherwise specified below, beginning one year after the granting of an emissions cap, the responsible official shall provide a certification to the Department that the facility has operated all emission units within the limits imposed by the emission cap. This certification shall include a brief summary of the emissions subject to the cap for that time period and a comparison to the threshold levels that would require compliance with an applicable requirement.

Item 1-14.5:
The emission of pollutants that exceed the applicability thresholds for an applicable requirement, for which the facility has obtained an emissions cap, constitutes a violation of Part 201 and of the Act.

Item 1-14.6:
The Compliance Certification activity will be performed for the Facility.

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 1-14.7:
Compliance Certification shall include the following monitoring:

Capping: Yes
Monitoring Type: WORK PRACTICE INVOLVING SPECIFIC OPERATIONS
Monitoring Description:
The facility is granted a net increase of 20.6 tpy of VOC emissions above the previous permit limit of 56.03 tpy. This increase is associated with the increase of gasoline throughput from 350 to 450 million gallons.

Work Practice Type: PROCESS MATERIAL THRUPUT

Delete Condition

Process Material: GASOLINE
Upper Permit Limit: 20.6 tons per year
Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Averaging Method: ANNUAL MAXIMUM ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 1-15: Capping Monitoring Condition
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-15.1:
Under the authority of 6 NYCRR Part 201-7, this condition contains an emission cap for the purpose of limiting emissions from the facility, emission unit or process to avoid being subject to the following applicable requirement(s) that the facility, emission unit or process would otherwise be subject to:

40 CFR 63.420 (a) (2)

Item 1-15.2:
Operation of this facility shall take place in accordance with the approved criteria, emission limits, terms, conditions and standards in this permit.

Item 1-15.3:
The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

Item 1-15.4:
On an annual basis, unless otherwise specified below, beginning one year after the granting of an emissions cap, the responsible official shall provide a certification to the Department that the facility has operated all emission units within the limits imposed by the emission cap. This certification shall include a brief summary of the emissions subject to the cap for that time period and a comparison to the threshold levels that would require compliance with an applicable requirement.

Item 1-15.5:
The emission of pollutants that exceed the applicability thresholds for an applicable requirement, for which the facility has obtained an emissions cap, constitutes a violation of Part 201 and of the Act.

Item 1-15.6:
The Compliance Certification activity will be performed for the Facility.

Regulated Contaminant(s):
CAS No: 000071-43-2 BENZENE

CAS No: 000091-20-3	NAPHTHALENE
~~CAS No: 000092-52-4~~	~~1, 1 BIPHENYL~~
~~CAS No: 000095-48-7~~	~~2-METHYL-PHENOL~~
CAS No: 000098-82-8	BENZENE, (1-METHYLETHYL)
CAS No: 000100-41-4	ETHYLBENZENE
~~CAS No: 000108-38-3~~	~~1,3 DIMETHYL BENZENE~~
CAS No: 000108-88-3	TOLUENE
~~CAS No: 000108-95-2~~	~~PHENOL~~
CAS No: 000110-54-3	HEXANE
CAS No: 000540-84-1	PENTANE, 2,2,4-TRIMETHYL-
CAS No: 0NY100-00-0	TOTAL HAP

CAS No: 001319-77-3

XYLENE, M, O & P MIXT.

Item 1-15.7:
Compliance Certification shall include the following monitoring:

Capping: Yes
Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
Total individual HAP emissions for the facility must not exceed 9.9 tons per year for any consecutive 12-month period. Total HAP emissions for the facility must not exceed 24.9 tons per year for any consecutive 12-month period. Verification of both of these caps shall be determined by means of emission calculations using methods approved by the Department. NOTE: The calculation methods, including the use of the EPA TANKS program, which were used to determine the total facility emissions for the Product Terminal Emission Report provided to support previous inventory statements, are acceptable.

Monitoring Frequency: MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 1-16: Capping Monitoring Condition
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-16.1:
Under the authority of 6 NYCRR Part 201-7, this condition contains an emission cap for the purpose of limiting emissions from the facility, emission unit or process to avoid being subject to the following applicable requirement(s) that the facility, emission unit or process would otherwise be subject to:

6 NYCRR Subpart 231-2

Item 1-16.2:
Operation of this facility shall take place in accordance with the approved criteria, emission limits, terms, conditions and standards in this permit.

Item 1-16.3:
The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

Item 1-16.4:
On an annual basis, unless otherwise specified below, beginning one year after the granting of an emissions cap, the responsible official shall provide a certification to the Department that the facility has operated all emission units within the limits imposed by the emission cap. This certification shall include a brief summary of the emissions subject to the cap for that time period and a comparison to the threshold levels that would require compliance with an applicable requirement.

Item 1-16.5:
The emission of pollutants that exceed the applicability thresholds for an applicable requirement, for which the facility has obtained an emissions cap, constitutes a violation of Part 201 and of the Act.

Item 1-16.6:
The Compliance Certification activity will be performed for the Facility.

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 1-16.7:
Compliance Certification shall include the following monitoring:

Capping: Yes
Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
Total gasoline throughput for the facility shall not exceed ~~450~~ mmgal per year for any consecutive 12-month period. Total distillate throughput for the facility shall not exceed 200 mmgal per year for any consecutive 12-month period.

603.3

Monitoring Frequency: MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 30: Air pollution prohibited
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 211.1

Item 30.1:
No person shall cause or allow emissions of air contaminants to the outdoor atmosphere of such

quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property. Notwithstanding the existence of specific air quality standards or emission limits, this prohibition applies, but is not limited to, any particulate, fume, gas, mist, odor, smoke, vapor, pollen, toxic or deleterious emission, either alone or in combination with others.

Condition 31: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 211.1

Item 31.1:
The Compliance Certification activity will be performed for the Facility.

Item 31.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

Facility shall establish a complaint response procedure to manage complaints related to air emissions from this facility. The procedure shall be designed to ensure that complaints from officials or neighbors are adequately received and documented, and that appropriate response is taken by the facility. The facility shall:
1. Have a complaint phone line available 24 hours a day, 7 days a week.
2. Investigate any possible causes of any complaint received.
3. Take prompt action to abate any circumstance which is found to be the cause of the complaint.
4. Fully document the complaint, results of investigation, and any action taken.
5. Report in a format acceptable to the Department.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2013.
Subsequent reports are due every 12 calendar month(s).

Condition 1-17: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 225-1.2

Item 1-17.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-17.2:

Compliance Certification shall include the following monitoring:

Monitoring Type: WORK PRACTICE INVOLVING SPECIFIC OPERATIONS
Monitoring Description:

Owners and/or operators of a stationary combustion installation that fires distillate oil other than number two heating oil are limited to the purchase of distillate oil with 0.0015 percent sulfur by weight or less on or after July 1, 2014 and are limited to the firing of distillate oil including number two heating oil with 0.0015 percent sulfur by weight or less on or after July 1, 2016.

The department will require fuel analyses, information on the quantity of fuel received, fired or sold, and results of stack sampling, stack monitoring, and other procedures to ensure compliance with the provisions of this Subpart. All records must be maintained at the facility for a minimum of five years.

Facility owners subject to this Subpart must submit a written report of the fuel sulfur content exceeding the applicable sulfur-in-fuel limitation, measured emissions exceeding the applicable sulfur-in-fuel limitation, measured emissions exceeding the applicable equivalent emission rate, and the nature and cause of such exceedances if known, for each calendar quarter, within 30 days after the end of any quarterly period in which an exceedances takes place.

Work Practice Type: PARAMETER OF PROCESS MATERIAL
Process Material: DISTILLATES - NUMBER 1 AND NUMBER 2 OIL
Parameter Monitored: SULFUR CONTENT
Upper Permit Limit: 0.0015 percent by weight
Monitoring Frequency: PER DELIVERY
Averaging Method: MAXIMUM - NOT TO BE EXCEEDED AT ANY TIME (INSTANTANEOUS/DISCRETE OR GRAB)
Reporting Requirements: QUARTERLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 10/30/2013.
Subsequent reports are due every 3 calendar month(s).

Condition 33: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 225-1.8

Item 33.1:
The Compliance Certification activity will be performed for the Facility.

Item 33.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

An owner or operator of a facility which sells fuel oil shall compile and retain records of the following information:
a. fuel analyses and data on the quantities of all residual and distillate oil received;
b. the names of all purchasers of all residual and distillate oil sold;
c. any results of stack sampling, stack monitoring and other procedures used to ensure compliance with the provisions of 6 NYCRR Part 225-1.

Fuel analyses must contain, as a minimum, data on the sulfur content, specific gravity and heating value of any residual oil or distillate oil. API gravity may be tracked as an alternative parameter to specific gravity and heating value provided the latter two items can still be determined. Ash content shall also be included in the fuel analyses for any residual oil. These records shall be retained for a minimum period of three years. If the facility is subject to Title V requirements the minimum record retention period shall be five years. The records shall be made available for inspection by department staff during normal business hours. In addition, copies of such records shall be furnished to department staff upon request. All required sampling, compositing and analysis of fuel samples must be done in accordance with methods acceptable to the department.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

Condition 1-18: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 225-3.3 (a)

Item 1-18.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-18.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: WORK PRACTICE INVOLVING SPECIFIC OPERATIONS
Monitoring Description:
Any gasoline sold or supplied to a retailer or wholesale purchaser-consumer, shall have a Reid vapor pressure (RVP) no greater than 9.0 pounds per square inch (psi), during the period May 1st through September 15th of each year. Sampling and testing will be done according to a protocol approved by the Department.

Work Practice Type: PARAMETER OF PROCESS MATERIAL
Process Material: GASOLINE
Parameter Monitored: REID VAPOR PRESSURE
Upper Permit Limit: 9.0 pounds per square inch absolute
Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Averaging Method: MAXIMUM - NOT TO BE EXCEEDED AT ANY TIME (INSTANTANEOUS/DISCRETE OR GRAB)
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 35: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 225-3.4 (a)

Item 35.1:
The Compliance Certification activity will be performed for the Facility.

Item 35.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
The owner or operator of this facility from which gasoline, subject to this Subpart, is distributed must maintain records on the gasoline that is delivered to or distributed from such facilities. These records shall include:

(1) The RVP of the gasoline if subject to section 225-3.3 of this Subpart.

(2) A designation of the appropriate time period(s) in which the gasoline is intended to be dispensed to motor vehicles.

(3) Written certification that the gasoline:

(i) conforms with all RVP and oxygen content requirements of this Subpart; and

(ii) is in compliance with all applicable State and Federal regulations which apply during the time period(s) specified pursuant to paragraph (3) of this subdivision.

Persons subject to the above recordkeeping requirements shall provide the following records with gasoline which is distributed from facilities:

(1) A copy of the certification produced for item 3 above.

(2) Documentation of the maximum RVP of the gasoline if the gasoline was subject to section 225-3.3 of this Subpart.

(3) Designation of the appropriate time period(s) in which the gasoline is intended to be dispensed to motor vehicles.

(4) Documentation of the shipment quantity and the shipment date of the gasoline being distributed.

Persons required to maintain the records listed above must make the records available for inspection during normal business hours, at the location from which the gasoline was delivered, sold, or dispensed, to the commissioner or his or her representative and must furnish copies of these records to the commissioner or his or her representative upon request. Such persons shall maintain all records and documentation required to be made or maintained in accordance with this section, including any calculations performed, for at least two years (five years for a Title V facility) from date of delivery.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

Condition 1-19: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 229.3 (a)

Item 1-19.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-19.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

No person may store petroleum liquid in a fixed roof tank subject to Part 229 unless:

1. the tank has been retrofitted with an internal floating roof or equivalent control; and

2. the vapor collection and vapor control systems are maintained and operated in such a way as to ensure the integrity and efficiency of the system.

The permittee must visually inspect the vapor collection and control systems every calendar quarter to ensure compliance with the above.

The permittee must visually inspect the floating roof and secondary seals from the tank roof hatch on an annual basis.

Records of all inspections must be maintained on site for a period of five years. Inspection records shall contain the date(s) of all inspections, inspection findings and a listing of all equipment repairs or replacements.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 1-20: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 229.5

Item 1-20.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-20.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

The owner or operator of a gasoline bulk plant, gasoline loading terminal , petroleum liquid storage tank, marine loading vessel facility, or volatile organic liquid storage tank subject to this Part must maintain the following records at the facility for a period for five years; a) capacities of petroleum liquid storage tanks subject to section 229.3(a) or (b) of the Part, in gallons; (b) average daily gasoline throughput per day for gasoline bulk plants subject to section 229.3 (c) of this Part, in gallons; (c) average daily gasoline throughput for gasoline loading terminals subject to section 229.3(d) of this Part, in gallons per year; (d) capacities of volatile organic liquid storage tanks, subject to section 229.3(e) of this Part, in gallons: and (e) daily gasoline throughput for marine vessel loading facilities subject to section 229.3(f) of this Part, in gallons.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 12 calendar month(s).

Condition 1-21: Modification Notification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:40CFR 60.7(a), NSPS Subpart A

Item 1-21.1:
Any owner or operator subject to 40 CFR Part 60 shall furnish the Administrator and this office with the following information:

- a notification of any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless the change is specifically exempted under 40 CFR Part 60. The notice shall be post marked 60 days or as soon as practicable before the change is commenced and shall include information describing the precise nature of the change, present and proposed emission control systems, productivity capability of the facility before and after the change, and the expected completion date of the change. The Administrator and/or this Department may request additional information regarding the change.

Condition 1-22: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:40CFR 60.113b(a), NSPS Subpart Kb

Item 1-22.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-22.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

The facility operator shall conduct the following testing and maintenance procedures on the internal floating roof VOC control system for an applicable storage vessel when storing gasoline:

(1) Visually inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service), prior to filling the storage vessel with VOL. If there are holes, tears, or other openings in the primary seal, the secondary seal, or the seal fabric or defects in the internal floating roof, or both, the owner or operator shall repair the items before filling the storage vessel.

(2) Visually inspect the internal floating roof and the primary seal or the secondary seal (if one is in service) through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, the owner or operator shall repair the items or empty and remove the storage vessel from service within 45 days. If a failure that is detected during inspections required in this paragraph cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, a 30-day extension may be requested from the Department in the inspection report required by this rule in Sec. 60.115b(a)(3). Such a request for an extension must document that alternate storage capacity is unavailable and specify a schedule of actions the company will take that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible.

(3) Visually inspect the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes and sleeve seals (if any) each time the storage vessel is emptied and degassed. If the internal floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, or the gaskets no longer close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the storage vessel with Volatile Organic Liquid (VOL). In no event shall inspections conducted in accordance with this requirement occur at intervals greater than 10 years in

the case of vessels conducting the annual visual inspection as specified in item (2).

(4) Notify the regional office in writing at least 30 days prior to the filling or refilling of each storage vessel for which an inspection is required by items (1) and (3) of this section to afford the Department the opportunity to have an observer present. If the inspection required by item (3) is not planned and the owner or operator could not have known about the inspection 30 days in advance or refilling the tank, the owner or operator shall notify the Department at least 7 days prior to the refilling of the storage vessel. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, this notification including the written documentation may be made in writing and sent by express mail so that it is received by the Department at least 7 days prior to the refilling.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 1-23: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:40CFR 60.115b(a), NSPS Subpart Kb

Item 1-23.1:
The Compliance Certification activity will be performed for the Facility.

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 1-23.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
The owner or operator shall keep a record of each inspection performed to monitor the condition of the internal floating roof. Each record shall identify the storage vessel on which the inspection was performed and shall contain the date the vessel was inspected and the observed condition of each component of the control equipment (seals, internal floating roof, and fittings).

After each inspection that finds holes or tears in the seal or seal fabric, defects in the internal floating roof, or other control equipment defects, a report shall be furnished to the Administrator within 30 days of the inspection. The report shall identify the storage vessel, the nature of the defects, and the type and date of each repair made.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 1-24: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:40CFR 60.116b, NSPS Subpart Kb

Item 1-24.1:
The Compliance Certification activity will be performed for the Facility.

Item 1-24.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

The facility shall maintain the following readily accessible records, for applicable storage vessels:
- records showing the dimension of the storage vessel
- an analysis showing the capacity of the storage vessel.

- a record of the Volatile Organic Liquid (VOL) stored, the period of storage, and the maximum true vapor pressure of that VOL during the respective storage period.

Available data on the storage temperature may be used to determine the maximum true vapor pressure as determined below:

(1) For vessels operated above or below ambient temperatures, the maximum true vapor pressure is calculated based upon the highest expected calendar-month average of the storage temperature. For vessels operated at ambient temperatures, the maximum true vapor pressure is calculated based upon the maximum local monthly average ambient temperature as reported by the National Weather Service.

(2) For crude oil or refined petroleum products the vapor pressure may be obtained by the following:

(i) Available data on the Reid vapor pressure and the maximum expected storage temperature based on the highest expected calendar- month average temperature of the stored product may be used to determine the maximum true vapor pressure from nomographs contained in API Bulletin 2517 (incorporated by reference--see Sec. 60.17), unless the Administrator specifically requests that the liquid be sampled, the actual storage temperature determined, and the Reid vapor pressure determined from the sample(s).

(ii) The true vapor pressure of each type of crude oil with a Reid vapor pressure less than 13.8 kPa or with physical properties that preclude determination by the recommended method is to be determined from available data and recorded if the estimated maximum true vapor pressure is greater than 3.5 kPa.

(3) For other liquids, the vapor pressure:
(i) May be obtained from standard reference texts, or

(ii) Determined by ASTM D2879-83, 96, or 97 (incorporated by reference--see Sec. 60.17); or
(iii) Measured by an appropriate method approved by the Administrator; or
(iv) Calculated by an appropriate method approved by the Administrator.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 1-25: Compliance Certification
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:40CFR 60.502, NSPS Subpart XX

Item 1-25.1:
The Compliance Certification activity will be performed for the Facility.

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 1-25.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: MONITORING OF PROCESS OR CONTROL DEVICE PARAMETERS AS SURROGATE
Monitoring Description:
This facility shall be equipped with a vapor collection

system designed to collect the total organic compounds vapors displaced from tank trucks during product loading. The emissions to the atmosphere
from the vapor collection system due to the loading of liquid product into gasoline tank trucks should not exceed the limit expressed elsewhere in this permit.

The vapor collection system shall be designed to prevent any total organic compounds vapors collected at one loading rack from passing to another loading rack. In addition, the following requirements shall
apply:
1. Loadings of liquid product into gasoline tank trucks shall be limited to vapor-tight gasoline tank trucks using the following procedures:
The owner or operator shall obtain the vapor tightness documentation described in 40 CFR 60.505(b) for each gasoline tank truck which is to be loaded at the affected facility. The owner or operator shall require the tank identification number to be recorded as each gasoline tank truck is loaded at the affected facility.

The owner or operator shall cross-check each tank identification number with the file of tank vapor tightness documentation within 2 weeks after the corresponding tank is loaded, unless either of the

following conditions is maintained:

(A) If less than an average of one gasoline tank truck per month over the last 26 weeks is loaded without vapor tightness documentation then the documentation cross-check shall be performed each quarter; or

(B) If less than an average of one gasoline tank truck per month over the last 52 weeks is loaded without vapor tightness documentation then the documentation cross-check shall be performed semiannually.
If either the quarterly or semiannual cross-check reveals that these conditions were not maintained, the source must return to biweekly monitoring until such time as these conditions are again met.
The terminal owner or operator shall notify the owner or operator of each non-vapor-tight gasoline tank truck loaded at the affected facility within 1 week of the documentation cross-check.
The terminal owner or operator shall take steps assuring that the nonvapor-tight gasoline tank truck will not be reloaded at the affected facility until vapor tightness documentation for that tank is obtained.
Alternate procedures to those described above for limiting gasoline tank truck loadings may be used upon application

to, and approval by, the Department.

2. The owner or operator shall act to assure that loadings of gasoline tank trucks at the affected facility are made only into tanks equipped with vapor collection equipment that is compatible with the terminal's vapor collection system.

3. The vapor collection and liquid loading equipment shall be designed and operated to prevent gauge pressure in the delivery tank from exceeding 4,500 pascals (450 mm of water) during product loading.
This level is not to be exceeded when measured by the procedures specified in 40 CFR 60.503(d).

4. No pressure-vacuum vent in the bulk gasoline terminal's vapor collection system shall begin to open at a system pressure less than 4,500 pascals (450 mm of water)

5. The owner or operator shall act to assure that the terminal's and the tank truck's vapor collection systems are connected during each loading of a gasoline tank truck at the affected facility. Examples of
actions to accomplish this include training drivers in the hookup procedures and posting visible reminder signs at the affected loading racks.

6. Each calendar month, the vapor collection system, the vapor processing system, and each loading rack handling gasoline shall be inspected during the loading of gasoline tank trucks for total organic compounds liquid or vapor leaks. For purposes of this paragraph, detection methods incorporating sight, sound, or smell are acceptable. Each detection of a leak shall be recorded and the source of the leak repaired within 15 calendar days after it is detected.

Documentation of all notifications shall be kept on file at the terminal for the duration of this permit, at a minimum.

Parameter Monitored: PRESSURE
Upper Permit Limit: 4500 Pascals
Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Averaging Method: MAXIMUM - NOT TO BE EXCEEDED AT ANY TIME (INSTANTANEOUS/DISCRETE OR GRAB)
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 44: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 63.11089, Subpart BBBBBB

Item 44.1:
The Compliance Certification activity will be performed for the Facility.

Item 44.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

Each owner/operator of a bulk gasoline terminal, bulk plant, pipeline breakout station, or pipeline pumping station subject to the provisions of subpart BBBBBB shall perform a monthly leak inspection of all equipment in gasoline service, as defined in §63.11100. For this inspection, detection methods incorporating sight, sound, and smell are acceptable.

A log book shall be used and shall be signed by the owner or operator at the completion of each inspection. A section of the log book shall contain a list, summary description, or diagram(s) showing the location of all equipment in gasoline service at the facility.

Each detection of a liquid or vapor leak shall be recorded in the log book. When a leak is detected, an initial attempt at repair shall be made as soon as practicable, but no later than 5 calendar days after the leak is detected. Repair or replacement of leaking equipment shall be completed within 15 calendar days after detection of each leak, except as provided in §63.11089(d).

Delay of repair of leaking equipment will be allowed if the repair is not feasible within 15 days. The owner or operator shall provide in the semiannual report specified in §63.11095(b), the reason(s) why the repair was not feasible and the date each repair was completed.

The facility must comply with the requirements of subpart BBBBBB by the applicable dates in §63.11083.

The facility must submit the applicable notifications as required under §63.11093.

The facility must keep records and submit reports as specified in §63.11094 and 63.11095.

Monitoring Frequency: MONTHLY

Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2013.
Subsequent reports are due every 12 calendar month(s).

****** Emission Unit Level ******

Condition 45: Emission Point Definition By Emission Unit
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR Subpart 201-6

Item 45.1(From Mod 1):
The following emission points are included in this permit for the cited Emission Unit:

Emission Unit: 1-RACK1

ADD: Emission Point: TRK01

Emission Point: TRK03

Emission Point: ~~00001~~ TRK02
Height (ft.): 16 Diameter (in.): 12
NYTMN (km.): 4498.923 NYTME (km.): 605.033

Item 45.2(From Mod 1):
The following emission points are included in this permit for the cited Emission Unit:

Emission Unit: 1-TANKS

Emission Point: ~~00004~~ 00T04
Height (ft.): ~~40~~ 39 Diameter (in.): 1200
NYTMN (km.): 4498.923 NYTME (km.): 605.033

Emission Point: ~~00005~~ 00T05
Height (ft.): ~~40~~ 39.5 Diameter (in.): 900
NYTMN (km.): 4498.923 NYTME (km.): 605.033

Emission Point: ~~00006~~ 00T06
Height (ft.): ~~40~~ 39.67 Diameter (in.): 600
NYTMN (km.): 4498.923 NYTME (km.): 605.033

Emission Point: ~~00007~~ 00T07
Height (ft.): ~~40~~ 39.67 Diameter (in.): 660
NYTMN (km.): 4498.923 NYTME (km.): 605.033

~~Emission Point: 00008~~
~~Height (ft.): 40 Diameter (in.): 720~~
~~NYTMN (km.): 4498.923 NYTME (km.): 605.033~~

Emission Point: ~~00010~~ 00T10
Height (ft.): ~~44~~ 43.83 Diameter (in.): 1500
NYTMN (km.): 4498.923 NYTME (km.): 605.033

ADD: Emission Unit: 1-FUGTV

Emission Point: EPFUG

Condition 46: Process Definition By Emission Unit
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR Subpart 201-6

Item 46.1(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-RACK1
Process: RDS Source Classification Code: 4-04-002-50
Process Description:
~~Tank trucks are top loaded with distillate at 3 bays, and bottom loaded with distillate in 2 bays. Two distillate bottom loading bays also are used to bottom load gasoline (process RGS). Note that gasoline vapors from tank trucks that are bottom loaded with distillate are sent to the vapor recovery system.~~

Truck loading of distillate. Loading is uncontrolled.

~~Emission Source/Control: VPORS - Control~~
~~Control Type: VAPOR RECOVERY SYS(INCL. CONDENSERS,HOODING, OTHER ENCLOSURES)~~

Emission Source/Control: RACK1 - Process
~~Design Capacity: 650,000,000 gallons per year~~

Item 46.2(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-RACK1
Process: RGS Source Classification Code: 4-04-002-50
Process Description:
~~Gasoline trucks are bottom loaded at 3 bays. Note that two of the bays may be used for bottom loading tank trucks with distillate (process RDS). Gasoline vapors are collected and are sent to the vapor reduction system.~~

Gasoline truck loading. Emissions are controlled by a VRU.

Emission Source/Control: ~~VPORS~~ VRU01 - Control
Control Type: VAPOR RECOVERY SYS(INCL. CONDENSERS,HOODING, OTHER ENCLOSURES)

Emission Source/Control: RACK1 - Process
~~Design Capacity: 650,000,000 gallons per year~~

ADD: Emission Unit: 1-RACK1
Process: RGB SCC Code: 4-04-002-50

Description: Gasoline truck loading controlled by the backup VRU.

Emission Source/Control: VRU02 - Control
Control Type: Vapor Recovery Sys (Incl. Condensers, Hooding, and Other Enclosures)

Emission Source/Control: RACK1 - Process

Item 46.3(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-RACK1
Process: ~~TTV~~ FTV Source Classification Code: 4-04-001-54
Process Description:
~~Fugitive emissions from leaks from tank trucks during loading.~~

Fugitive emissions from loading trucks controlled by Vacuum Assisted Vapor Reduction System.

Add: Emission Source/Control: VACTK - Control

Control Type: Vacuum Assisted Vapor Reduction System

~~Emission Source/Control: VPORS - Control~~
~~Control Type: VAPOR RECOVERY SYS(INCL. CONDENSERS,HOODING, OTHER ENCLOSURES)~~

Emission Source/Control: RACK1 - Process
~~Design Capacity: 650,000,000 gallons per year~~

Item 46.4(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

~~Emission Unit: 1-RACK1~~
~~Process: VRU~~ ~~Source Classification Code: 4-04-001-52~~
~~Process Description:~~
~~Fugitive emissions from losses from the vapor recovery unit.~~

~~Emission Source/Control: VPORS - Control~~
~~Control Type: VAPOR RECOVERY SYS(INCL. CONDENSERS,HOODING, OTHER ENCLOSURES)~~

~~Emission Source/Control: RACK1 - Process~~
~~Design Capacity: 650,000,000 gallons per year~~

Item 46.5(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: ~~1-TANKS~~ 1-FUGTV
Process: FG1 Source Classification Code: 4-04-001-51
Process Description:
~~Miscellaneous fugitive HAP and VOC emissions from valves, pumps,. and flanges leakage, all emissions are at insignificant levels.~~

Miscellaneous fugitive HAP and VOC emissions from valves, pumps, and miscellaneous equipment leakage.

Emission Source/Control: ~~FVPMP~~ FUGTV - Process

Item 46.6(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-TANKS
Process: GAS Source Classification Code: 4-04-001-60
Process Description:
Five (5) ~~Six (6)~~ storage tanks, each having a capacity of greater than 40,000 gallons~~,~~ storing gasoline ~~with a maximum vapor pressure of 12.0 psia @ 70 degree F)~~. Each tank has a fixed roof with an internal floating roof system. ~~Only 5 tanks will be in gasoline or vol service at a time.~~

~~Emission Source/Control: FLRFS - Control~~
~~Control Type: FLOATING ROOF~~

ADD: Emission Source/Control: FLR04 - Control
Control Type: Floating Roof

Emission Source/Control: TK004 - Process
Design Capacity: ~~2,037,224~~ 2,115,695 gallons

Emission Source/Control: TK005 - Process
Design Capacity: ~~1,149,389~~ 1,245,672 gallons

ADD: Emission Source/Control: FLR05 - Control
Control Type: Floating Roof

Emission Source/Control: TK006 - Process
Design Capacity: ~~484,094~~ 533,432 gallons

ADD: Emission Source/Control: FLR06 - Control
Control Type: Floating Roof

Emission Source/Control: TK007 - Process
Design Capacity: ~~602,104~~ 658,805 gallons

ADD: Emission Source/Control: FLR07 - Control
Control Type: Floating Roof

~~Emission Source/Control: TK008 - Process~~
~~Design Capacity: 703,930 gallons~~

Emission Source/Control: TK010 - Process
Design Capacity: ~~2,784,079~~ 3,868,130 gallons

ADD: Emission Source/Control: FLR10 - Control
Control Type: Floating Roof

Item 46.7(From Mod 1):
This permit authorizes the following regulated processes for the cited Emission Unit:

Emission Unit: 1-TANKS
Process: VOL Source Classification Code: 4-04-001-60
Process Description:
Five (5) ~~Six (6)~~ storage tanks, each having a capacity of greater than 40,000 gallons, storing petroleum hydrocarbons with a maximum true vapor pressure of 11.1 psi. ~~maximum vapor pressure of 12.0 psia @ 70 F)~~. Each tank has a fixed roof with an internal floating roof system. ~~Only 5 tanks will be in gasoline or vol service at a time.~~

~~Emission Source/Control: FLRFS - Control~~
~~Control Type: FLOATING ROOF~~

Emission Source/Control: TK004 - Process
Design Capacity: ~~2,037,224~~ 2,115,695 gallons

ADD: Emission Source/Control: FLR04 - Control
Control Type: Floating Roof

Emission Source/Control: TK005 - Process
Design Capacity: ~~1,149,389~~ 1,245,672 gallons

ADD: Emission Source/Control: FLR05 - Control
Control Type: Floating Roof

Emission Source/Control: TK006 - Process
Design Capacity: ~~484,094~~ 533,432 gallons

ADD: Emission Source/Control: FLR06 - Control
Control Type: Floating Roof

Emission Source/Control: TK007 - Process
Design Capacity: ~~602,104~~ 658,805 gallons

ADD: Emission Source/Control: FLR07 - Control
Control Type: Floating Roof

~~Emission Source/Control: TK008 - Process~~
~~Design Capacity: 703,930 gallons~~

Emission Source/Control: TK010 - Process
Design Capacity: ~~2,784,079~~ 3,868,130 gallons

ADD: Emission Source/Control: FLR10 - Control
Control Type: Floating Roof

Condition 1-26: Emission Unit Permissible Emissions
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-26.1:
The sum of emissions from all regulated processes specified in this permit for the emission unit cited
shall not exceed the following Potential to Emit (PTE) rates for each regulated contaminant:

Emission Unit: 1-RACK1

CAS No: 0NY998000 (From Mod 1)
Name: VOC
PTE(s): ~~13.4~~ 2.05 pounds per hour ~~70,427 pounds per year~~ 17,940 pounds per year

Emission Unit: 1-TANKS

CAS No: 0NY998000 (From Mod 1)
Name: VOC
PTE(s): ~~5.66~~ 8.37 pounds per hour ~~52,647 pounds per year~~ 73,340 pounds per year

Condition 48: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 63.11088, Subpart BBBBBB

Item 48.1:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 48.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
The owner and/or operator of a gasoline loading rack having a throughput of greater than or equal to 250,000 gallons/day, shall be subject to the following requirements:

a) Equip the loading rack(s) with a vapor collection system designed to collect the TOC vapors displaced from cargo tanks during product loading; and
b) Reduce emissions of TOC to less than or equal to 80 mg/l of gasoline loaded into gasoline cargo tanks at the loading rack; and
c) Design and operate the vapor collection system to

prevent any TOC vapors collected at one loading rack from passing to another loading rack; and
d) Limit the loading of gasoline into gasoline cargo tanks that are vapor tight using the procedures specified in §60.502(e)-(j). For the purposes of this condition, the term "tank truck' as used in §60.502(e)-(j) means "cargo tank" as defined in subpart BBBBBB in §63.11100.

The facility shall comply with the requirements of subpart BBBBBB by the applicable dates specified in §63.11083.

The facility must comply with the testing and monitoring requirements specified in §63.11092(a).

The facility must keep records and submit reports as specified in §63.11094 and 11095.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

Condition 49: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 63.11092(a), Subpart BBBBBB

Item 49.1:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 49.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: INTERMITTENT EMISSION TESTING
Monitoring Description:
The owner and/or operator of a facility subject to the emission standard in §63.11088 for gasoline loading racks must conduct a performance test on the vapor processing and collection systems according to either of the following methods;

- test methods and procedures in §60.503, except a reading of 500ppm shall be used to determine the level of leaks to be repaired under §60.503(b), or;

- alternative test methods and procedures in accordance with the alternative test method requirements in §63.7(f).

Upper Permit Limit: 80 milligrams per liter
Averaging Method: AVERAGING METHOD AS PER REFERENCE TEST METHOD INDICATED
Reporting Requirements: AS REQUIRED - SEE MONITORING DESCRIPTION

Condition 50: RACT analysis exemption for major facilities in the New York City Metropolitan Area and Lower Orange County Metropolitan Area
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 212.10 (c) (1)

Item 50.1:
This Condition applies to Emission Unit: 1-RACK1
Process: RDS

Item 50.2:
Owners of facilities located in the lower Orange County or New York City metropolitan areas with an annual potential to emit 25 tons or more of nitrogen oxides or 25 tons or more of volatile organic compounds must comply with the requirements of 6NYCRR Part 212.10: Reasonably Available Control Technology (RACT) for major facilities.

At such facilities, emission points with nitrogen oxide and volatile organic compound emission rate potentials less than 3.0 pounds per hour and with actual emissions in the absence of control equipment less than 15.0 pounds per day are exempt from the RACT requirements.

Condition 1-27: RACT analysis exemption for major facilities in the New York City Metropolitan Area and Lower Orange County Metropolitan Area
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 212.10 (c) (1)

Item 1-27.1:
This Condition applies to Emission Unit: 1-RACK1
Process: RDS Emission Source: RACK1

Item 1-27.2:
Owners of facilities located in the lower Orange County or New York City metropolitan areas with an annual potential to emit 25 tons or more of nitrogen oxides or 25 tons or more of volatile organic compounds must comply with the requirements of 6NYCRR Part 212.10: Reasonably Available Control Technology (RACT) for major facilities.

At such facilities, emission points with nitrogen oxide and volatile organic compound emission rate potentials less than 3.0 pounds per hour and with actual emissions in the absence of control equipment less than 15.0 pounds per day are exempt from the RACT requirements.

Condition 1-28: Capping Monitoring Condition
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-28.1:
Under the authority of 6 NYCRR Part 201-7, this condition contains an emission cap for the purpose of limiting emissions from the facility, emission unit or process to avoid being subject to the following applicable requirement(s) that the facility, emission unit or process would otherwise be subject to:

6 NYCRR Subpart 231-2
40 CFR 63.420 (a) (2)

Item 1-28.2:
Operation of this facility shall take place in accordance with the approved criteria, emission limits, terms, conditions and standards in this permit.

Item 1-28.3:
The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

Item 1-28.4:
On an annual basis, unless otherwise specified below, beginning one year after the granting of an emissions cap, the responsible official shall provide a certification to the Department that the facility has operated all emission units within the limits imposed by the emission cap. This certification shall include a brief summary of the emissions subject to the cap for that time period and a comparison to the threshold levels that would require compliance with an applicable requirement.

Item 1-28.5:
The emission of pollutants that exceed the applicability thresholds for an applicable requirement, for which the facility has obtained an emissions cap, constitutes a violation of Part 201 and of the Act.

Item 1-28.6:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1
Process: RGS

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 1-28.7:
Compliance Certification shall include the following monitoring:

Capping: Yes
Monitoring Type: INTERMITTENT EMISSION TESTING
Monitoring Description:

The gasoline vapor collection and control system required at this facility must capture gasoline vapors during loading and unloading of gasoline transport vehicles, and must condense, absorb, absorb or combust the gasoline vapors so emissions do not exceed ~~10 milligrams~~ of Total Organic Compounds (TOC) per liter gasoline loaded or unloaded. Compliance with this limit will be demonstrated by means of a stack emissions test using test methods and procedures specified in 40 CFR 60.503, Subpart XX. The facility must perform this test at lease once during the term of this permit unless additional testing is mandated, in writing, by the Department.

3 milligrams

Repeat Condition for backup VRU (VRU02)

See attacked application

Upper Permit Limit: ~~10~~ 3 milligrams per liter
Reference Test Method: 40 CFR 60 .503
Monitoring Frequency: ONCE DURING THE TERM OF THE PERMIT
Averaging Method: AVERAGING METHOD AS PER REFERENCE TEST METHOD INDICATED
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Condition 51: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 60.505(b), NSPS Subpart XX

Item 51.1:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1
Process: RGS Emission Source: RACK1

Item 51.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

Loadings of liquid product into gasoline tank trucks shall be limited to those gasoline tank trucks which have had their vapor tightness properly documented. The tank truck vapor tightness documentation shall be kept on file at the terminal in a permanent form available for inspection. The documentation file for each gasoline tank truck shall be updated at least once per year to reflect current test results as determined by Method 27. This documentation shall include, as a minimum, the following information:

(1) Test title: Gasoline Delivery Tank Pressure Test--EPA Reference Method 27.
(2) Tank owner and address.
(3) Tank identification number.
(4) Testing location.
(5) Date of test.
(6) Tester name and signature.
(7) Witnessing inspector, if any: Name, signature, and affiliation.
(8) Test results: Actual pressure change in 5 minutes, mm of water (average for 2 runs).

[NOTE: As an alternative to keeping records at the terminal of each gasoline cargo tank test result, 40 CFR 60.505(e) the facility may comply with the requirements in either paragraph (1) or (2) below:

(1) An electronic copy of each record is instantly available at the terminal.
(i) The copy of each record is an exact duplicate image of the original paper record with certifying signatures.

(ii) The department is notified in writing that the each terminal using this alternative is in compliance with the recordkeeping requirements of 40 CFR 60.505.

(2) For facilities that utilize a terminal automation system to prevent gasoline cargo tanks that do not have valid cargo tank vapor tightness documentation from loading (e.g., via a card lock-out system), a copy of the documentation is made available (e.g., via facsimile) for inspection by department representatives during the

course of a site visit, or within a mutually agreeable time frame.
(i) The copy of each record is an exact duplicate image of the original paper record with certifying signatures.

(ii) The permitting authority is notified in writing that each terminal using this alternative is in compliance with with the recordkeeping requirements of 40 CFR 60.505.]

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

Condition 52: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 60.505(c), NSPS Subpart XX

Item 52.1:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1
Process: RGS Emission Source: RACK1

Item 52.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

As required under 40 CFR 60.502(j), the vapor collection system, the vapor processing system, and all loading racks handling gasoline will require a monthly inspection during the loading of gasoline tank trucks for total organic compounds liquid or vapor leaks. A record of each monthly leak inspection shall be kept on file at the terminal for at least 2 years. Inspection records shall include, as a minimum, the following information:
(1) Date of inspection.
(2) Findings (may indicate no leaks discovered; or location, nature, and severity of each leak).
(3) Leak determination method.
(4) Corrective action (date each leak repaired; reasons for any repair interval in excess of 15 days).
(5) Inspector name and signature.

[NOTE: As an alternative to keeping records at the terminal of each gasoline cargo tank test result, 40 CFR 60.505(e) the facility may comply with the requirements in either paragraph (1) or (2) below:

(1) An electronic copy of each record is instantly available at the terminal.
(i) The copy of each record is an exact duplicate image of the original paper record with certifying signatures.

(ii) The department is notified in writing that the each terminal using this alternative is in compliance with the recordkeeping requirements of 40 CFR 60.505.

(2) For facilities that utilize a terminal automation system to prevent gasoline cargo tanks that do not have valid cargo tank vapor tightness documentation from loading (e.g., via a card lock-out system), a copy of the documentation is made available (e.g., via facsimile) for inspection by department representatives during the

course of a site visit, or within a mutually agreeable time frame.

(i) The copy of each record is an exact duplicate image of the original paper record with certifying signatures.

(ii) The permitting authority is notified in writing that each terminal using this alternative is in compliance with with the recordkeeping requirements of 40 CFR 60.505.]

Monitoring Frequency: MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

Condition 53: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 60.505(f), NSPS Subpart XX

Item 53.1:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1
Process: RGS Emission Source: RACK1

Regulated Contaminant(s):
CAS No: 0NY998-00-0 VOC

Item 53.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
Records of all replacements or additions of components performed on an existing vapor processing system shall be kept for at least 3 years. However if this facility is subject to Title V requirements, the records shall be kept for at least 5 years.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

Condition 54: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40 CFR Part 64

Item 54.1:
The Compliance Certification activity will be performed for:

RACK1

Emission Unit: 1-RACK1
Process: RGS Emission Source: ~~VPORS~~

Control: VRU01

Item 54.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
The following is the compliance assurance monitoring (CAM) plan for the vapor recovery unit or VRU :

A CEMS is used as the continuous monitoring parameter for the CAM plan. Daily drift checks are performed automatically by the system. Daily drift checks are used to evaluate if the CEMS needs to be calibrated.

The following parameters will be monitored when the CEMS is not operational:
SEE ATTACHED APPLICATION FORM

~~INDICATOR 1: CARBON BED TEMPERATURE VRU MEASUREMENT APPROACH:
Bed temperature measured continuously via probe inserted directly in bed. Signal from probe directed to external thermocouple.~~

~~INDICATOR RANGE: < 150 F
If temperature > 150 F for two consecutive 30 minute bed regeneration cycles or > 200 F for a single cycle, corrective action is to be taken.~~

~~DATA REPRESENTATIVENESS: Temperature probe placed directly in carbon bed. Rise in bed temperature indicative of poor performance or reduced VOC adsorption capacity.~~

~~QA/QA PRACTICES and CRITERIA: Thermometer temperature calibrations performed annually. Accuracy of the thermometer will be determined against known standards~~

~~Preventative maintenance of VRU performed at a minimum on a semiannual basis by a certified subcontractor.
Facility staff are to perform daily checks to verify operational status of VRU and adherence to system performance criteria.~~

~~Compliance testing of VRU emissions on a once/5 year cycle.
Compliance testing will include demonstration that VOC emissions are below permit limit (<10 mg VOC/liter of product loaded)~~

~~MONITORING FREQUENCY and DATA COLLECTION PROCEDURE:
Readings are to be collected on a daily basis by direct reading of carbon bed temperature gauge. Readings are recorded as the nearest 5 degree F increment (+/- 5 F).~~

Duration of reading should be at least one loading cycle of each carbon bed, approximately 30 minutes. Data is recorded and reported on a daily basis. If the reading exceeds the indicator threshold value of 150 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.

INDICATOR 2: CARBON REGENERATION CYCLE VACUUM PRESSURE
MEASUREMENT APPROACH:
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.

See attached application form

INDICATOR RANGE: Vacuum during regeneration > 25" Hg sustained. If the vacuum is not sustained for an entire cycle, corrective action is warranted

DATA REPRESENTATIVENESS: Pressure or vacuum gauge placed in line such that it measures vacuum placed on carbon bed directly. If vacuum placed on carbon bed is not adequate that VOC may not be recovered and carbon bed not adequately regenerated. If not regenerated properly bed will have reduced capacity for sorption of volatile organics.

QA/QC PRACTICES and CRITERIA: VRU preventative maintenance inspections performed on a quarterly basis by a certified subcontractor to determine that the duration of vacuum is adequate for thorough bed regeneration. Pressure gauge calibrations performed annually.

Facility staff are to conduct daily checks to verify operational status of VRU and adherence to system performance criteria.

Compliance testing of VRU emissions on a once/5 year cycle. Compliance testing includes demonstration that VOC emissions are below permit limit (<10 mg VOC/liter of product loaded)

MONITORING FREQUENCY and DATA COLLECTION PROCEDURE:
Readings collected on a daily basis by direct reading of vacuum gauge. 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 inches Hg, 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.

A monitoring report must be submitted semiannually which summarizes the number, duration, and cause of exceedances and corrective actions taken. These records are to be maintained for a period of five years.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 7/30/2012.
Subsequent reports are due every 6 calendar month(s).

See application for backup VRU monitoring

Condition 1-29: Capping Monitoring Condition
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-29.1:
Under the authority of 6 NYCRR Part 201-7, this condition contains an emission cap for the purpose of limiting emissions from the facility, emission unit or process to avoid being subject to the following applicable requirement(s) that the facility, emission unit or process would otherwise be subject to:

6 NYCRR Subpart 231-2
40 CFR 63.420 (a) (2)

Item 1-29.2:
Operation of this facility shall take place in accordance with the approved criteria, emission limits, terms, conditions and standards in this permit.

Item 1-29.3:
The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

Item 1-29.4:
On an annual basis, unless otherwise specified below, beginning one year after the granting of an emissions cap, the responsible official shall provide a certification to the Department that the facility has operated all emission units within the limits imposed by the emission cap. This certification shall include a brief summary of the emissions subject to the cap for that time period and a comparison to the threshold levels that would require compliance with an applicable requirement.

Item 1-29.5:

The emission of pollutants that exceed the applicability thresholds for an applicable requirement, for which the facility has obtained an emissions cap, constitutes a violation of Part 201 and of the Act.

Item 1-29.6:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1 Emission Point: 00001
Process: RDS

Regulated Contaminant(s):

CAS No: 000071-43-2	BENZENE
CAS No: 000091-20-3	NAPHTHALENE
~~CAS No: 000092-52-4~~	~~1, 1 BIPHENYL~~
~~CAS No: 000095-48-7~~	~~2-METHYL PHENOL~~
CAS No: 000098-82-8	BENZENE, (1-METHYLETHYL)
CAS No: 000100-41-4	ETHYLBENZENE
~~CAS No: 000108-38-3~~	~~1,3 DIMETHYL BENZENE~~
CAS No: 000108-88-3	TOLUENE
~~CAS No: 000108-95-2~~	~~PHENOL~~
CAS No: 000110-54-3	HEXANE
CAS No: 000540-84-1	PENTANE, 2,2,4-TRIMETHYL-
~~CAS No: 001634-04-4~~	~~METHYL TERTBUTYL ETHER~~
CAS No: 0NY998-00-0	VOC
CAS No: 0NY100-00-0	TOTAL HAP
CAS No: 0NY998-00-0	VOC

CAS No: 001319-77-3

XYLENE, M, O & P MIXT.

Item 1-29.7:
Compliance Certification shall include the following monitoring:

Capping: Yes
Monitoring Type: WORK PRACTICE INVOLVING SPECIFIC OPERATIONS
Monitoring Description:
The facility shall not exceed a distillate oil throughput of 200 million gallons per any consecutive 12-month period. The facility shall retain records on site showing the amount of distillate delivered to and distributed by the facility on a monthly basis in order to verify compliance with the above throughput limit. Records shall be maintained for a period of 5 years as per Title V requirements.

Work Practice Type: PROCESS MATERIAL THRUPUT
Process Material: DISTILLATES - NUMBER 1 AND NUMBER 2 OIL
Upper Permit Limit: 200 million gallons
Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Averaging Method: ANNUAL MAXIMUM ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.

Subsequent reports are due every 6 calendar month(s).

Condition 1-30: Capping Monitoring Condition
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 201-7.1 (a)

Item 1-30.1:
Under the authority of 6 NYCRR Part 201-7, this condition contains an emission cap for the purpose of limiting emissions from the facility, emission unit or process to avoid being subject to the following applicable requirement(s) that the facility, emission unit or process would otherwise be subject to:

6 NYCRR Subpart 231-2
40 CFR 63.420 (a) (2)

Item 1-30.2:
Operation of this facility shall take place in accordance with the approved criteria, emission limits, terms, conditions and standards in this permit.

Item 1-30.3:
The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

Item 1-30.4:
On an annual basis, unless otherwise specified below, beginning one year after the granting of an emissions cap, the responsible official shall provide a certification to the Department that the facility has operated all emission units within the limits imposed by the emission cap. This certification shall include a brief summary of the emissions subject to the cap for that time period and a comparison to the threshold levels that would require compliance with an applicable requirement.

Item 1-30.5:
The emission of pollutants that exceed the applicability thresholds for an applicable requirement, for which the facility has obtained an emissions cap, constitutes a violation of Part 201 and of the Act.

Item 1-30.6:
The Compliance Certification activity will be performed for:

Emission Unit: 1-RACK1 Emission Point: 00001
Process: RGS

Regulated Contaminant(s):

CAS No: 000071-43-2 BENZENE
CAS No: 000091-20-3 NAPHTHALENE
~~CAS No: 000092-52-4 1, 1 BIPHENYL~~
~~CAS No: 000095-48-7 2-METHYL-PHENOL~~
CAS No: 000098-82-8 BENZENE, (1-METHYLETHYL)

CAS No: 000100-41-4	ETHYLBENZENE
~~CAS No: 000108-38-3~~	~~1,3 DIMETHYL BENZENE~~
CAS No: 000108-88-3	TOLUENE
~~CAS No: 000108-95-2~~	~~PHENOL~~
CAS No: 000110-54-3	HEXANE
CAS No: 000540-84-1	PENTANE, 2,2,4-TRIMETHYL-
~~CAS No: 001634-04-4~~	~~METHYL TERTBUTYL ETHER~~
CAS No: 0NY998-00-0	VOC
CAS No: 0NY100-00-0	TOTAL HAP
CAS No: 0NY998-00-0	VOC

Item 1-30.7:
Compliance Certification shall include the following monitoring:

Capping: Yes
Monitoring Type: WORK PRACTICE INVOLVING SPECIFIC OPERATIONS
Monitoring Description:
The facility shall not exceed a gasoline throughput of
603.3 → ~~450~~ million gallons per any consecutive 12-month period. The facility shall retain records on site showing the amount of gasoline delivered to and distributed by the facility on a monthly basis in order to verify compliance with the above throughput limit. Records shall be maintained for a period of 5 years as per Title V requirements.

Work Practice Type: PROCESS MATERIAL THRUPUT
Process Material: GASOLINE
Upper Permit Limit: ~~450~~ 603.3 million gallons
Monitoring Frequency: MONTHLY
Averaging Method: ANNUAL TOTAL ROLLED MONTHLY
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Repeat condition for Gasoline throughput with backup VRU. See application form.

See application forms for Gasoline Operating Scenarios

Condition 1-31: VOL fixed roof storage tank requirements
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable Federal Requirement:6 NYCRR 229.3 (e) (1)

Item 1-31.1:
This Condition applies to Emission Unit: 1-TANKS

Item 1-31.2:
For a fixed roof storage tank storing volatile organic liquids, the tank must be equipped with an internal floating roof with a liquid-mounted primary seal and gasket fittings or equivalent control. Replacement of other than liquid-mounted seals is to be performed when the tank is cleaned and gas-free for other purposes.

Condition 55: Compliance Certification
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 63.11092(e)(1), Subpart BBBBBB

Item 55.1:
The Compliance Certification activity will be performed for:

Emission Unit: 1-TANKS

Item 55.2:
Compliance Certification shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:
Each owner/operator subject to the emission standard in §63.11087 for gasoline storage tanks that are equipped with an internal floating roof shall perform inspections of the floating roof system according to the requirements of §60.113b(a) if the facility is complying with option 2(b) of table 1 of subpart BBBBBB. If the facility is complying with option 2(d) of table 1 of subpart BBBBBB, then the facility shall comply with the requirements in §63.1063(c)(1).

Reporting Requirements: ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2013.
Subsequent reports are due every 12 calendar month(s).

Condition 56: VOC standard for volatile organic liquid storage vessels equipped with a fixed roof in combination with a internal floating roof
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 60.112b(a)(1), NSPS Subpart Kb

Item 56.1:
This Condition applies to Emission Unit: 1-TANKS
Process: GAS Emission Source: TK010

Item 56.2:
The owner or operator of each storage vessel which meets the applicability criteria listed in 40 CFR 60.112b(a) and is equipped with a fixed roof in combination with an internal floating roof shall meet the following specifications:
(i) The internal floating roof shall rest or float on the liquid surface (but not necessarily in complete contact with it) inside a storage vessel that has a fixed roof. The internal floating roof shall be floating on the liquid surface at all times, except during initial fill and during those intervals when the storage vessel is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process

of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.

(ii) Each internal floating roof shall be equipped with one of the following closure devices between the wall of the storage vessel and the edge of the internal floating roof:

(A) A foam- or liquid-filled seal mounted in contact with the liquid (liquid-mounted seal). A liquid-mounted seal means a foam- or liquid- filled seal mounted in contact with the liquid between the wall of the storage vessel and the floating roof continuously around the circumference of the tank.

(B) Two seals mounted one above the other so that each forms a continuous closure that completely covers the space between the wall of the storage vessel and the edge of the internal floating roof. The lower seal may be vapor-mounted, but both must be continuous.

(C) A mechanical shoe seal. A mechanical shoe seal is a metal sheet held vertically against the wall of the storage vessel by springs or weighted levers and is connected by braces to the floating roof. A flexible coated fabric (envelope) spans the annular space between the metal sheet and the floating roof.

(iii) Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the liquid surface.

(iv) Each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains is to be equipped with a cover or lid which is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket. Covers on each access hatch and automatic gauge float well shall be bolted except when they are in use.

(v) Automatic bleeder vents shall be equipped with a gasket and are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.

(vi) Rim space vents shall be equipped with a gasket and are to be set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting.

(vii) Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening.

(viii) Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover.

(ix) Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.

Condition 57: VOC standard for volatile organic liquid storage vessels equipped with a fixed roof in combination with a internal floating roof

Effective between the dates of 01/17/2012 and 01/16/2017

Applicable Federal Requirement:40CFR 60.112b(a)(1), NSPS Subpart Kb

Item 57.1:

This Condition applies to Emission Unit: 1-TANKS
Process: VOL Emission Source: TK010

Item 57.2:
The owner or operator of each storage vessel which meets the applicability criteria listed in 40 CFR 60.112b(a) and is equipped with a fixed roof in combination with an internal floating roof shall meet the following specifications:

(i) The internal floating roof shall rest or float on the liquid surface (but not necessarily in complete contact with it) inside a storage vessel that has a fixed roof. The internal floating roof shall be floating on the liquid surface at all times, except during initial fill and during those intervals when the storage vessel is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.

(ii) Each internal floating roof shall be equipped with one of the following closure devices between the wall of the storage vessel and the edge of the internal floating roof:

(A) A foam- or liquid-filled seal mounted in contact with the liquid (liquid-mounted seal). A liquid-mounted seal means a foam- or liquid- filled seal mounted in contact with the liquid between the wall of the storage vessel and the floating roof continuously around the circumference of the tank.

(B) Two seals mounted one above the other so that each forms a continuous closure that completely covers the space between the wall of the storage vessel and the edge of the internal floating roof. The lower seal may be vapor-mounted, but both must be continuous.

(C) A mechanical shoe seal. A mechanical shoe seal is a metal sheet held vertically against the wall of the storage vessel by springs or weighted levers and is connected by braces to the floating roof. A flexible coated fabric (envelope) spans the annular space between the metal sheet and the floating roof.

(iii) Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the liquid surface.

(iv) Each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains is to be equipped with a cover or lid which is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket. Covers on each access hatch and automatic gauge float well shall be bolted except when they are in use.

(v) Automatic bleeder vents shall be equipped with a gasket and are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.

(vi) Rim space vents shall be equipped with a gasket and are to be set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting.

(vii) Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening.

(viii) Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover.

(ix) Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.

STATE ONLY ENFORCEABLE CONDITIONS
****** Facility Level ******

NOTIFICATION OF GENERAL PERMITTEE OBLIGATIONS
This section contains terms and conditions which are not federally enforceable. Permittees may also have other obligations under regulations of general applicability

Item A: **General Provisions for State Enforceable Permit Terms and Condition - 6 NYCRR Part 201-5**
Any person who owns and/or operates stationary sources shall operate and maintain all emission units and any required emission control devices in compliance with all applicable Parts of this Chapter and existing laws, and shall operate the facility in accordance with all criteria, emission limits, terms, conditions, and standards in this permit. Failure of such person to properly operate and maintain the effectiveness of such emission units and emission control devices may be sufficient reason for the Department to revoke or deny a permit.

The owner or operator of the permitted facility must maintain all required records on-site for a period of five years and make them available to representatives of the Department upon request. Department representatives must be granted access to any facility regulated by this Subpart, during normal operating hours, for the purpose of determining compliance with this and any other state and federal air pollution control requirements, regulations or law.

STATE ONLY APPLICABLE REQUIREMENTS
The following conditions are state applicable requirements and are not subject to compliance certification requirements unless otherwise noted or required under 6 NYCRR Part 201.

Condition 58: Contaminant List
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable State Requirement:ECL 19-0301

Item 58.1:
Emissions of the following contaminants are subject to contaminant specific requirements in this permit(emission limits, control requirements or compliance monitoring conditions).

CAS No: 000071-43-2
Name: BENZENE

CAS No: 000091-20-3
Name: NAPHTHALENE

~~CAS No: 000092-52-4~~
~~Name: 1, 1 BIPHENYL~~

~~CAS No: 000095-48-7~~
~~Name: 2-METHYL-PHENOL~~

CAS No: 000098-82-8
Name: BENZENE, (1-METHYLETHYL)

CAS No: 000100-41-4
Name: ETHYLBENZENE

CAS No: 001319-77-3

XYLENE, M, O & P MIXT.

~~CAS No: 000108-38-3~~
~~Name: 1,3 DIMETHYL BENZENE~~

CAS No: 000108-88-3
Name: TOLUENE

~~CAS No: 000108-95-2~~
~~Name: PHENOL~~

CAS No: 000110-54-3
Name: HEXANE

CAS No: 000540-84-1
Name: PENTANE, 2,2,4-TRIMETHYL-

~~CAS No: 001634-04-4~~
~~Name: METHYL TERTBUTYL ETHER~~

CAS No: 0NY100-00-0
Name: TOTAL HAP

CAS No: 0NY998-00-0
Name: VOC

Condition 1-32: Malfunctions and start-up/shutdown activities
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable State Requirement:6 NYCRR 201-1.4

Item 1-32.1:
(a) The facility owner or operator shall take all necessary and appropriate actions to prevent the emission of air pollutants that result in contravention of any applicable emission standard during periods of start-up, shutdown, or malfunction.

(b) The facility owner or operator shall compile and maintain records of all equipment malfunctions, maintenance, or start-up/shutdown activities when they can be expected to result in an exceedance of any applicable emission standard, and shall submit a report of such activities to the department when requested to do so, or when so required by a condition of a permit issued for the corresponding air contamination source. Such reports shall state whether any violations occurred and, if so, whether they were unavoidable, include the time, frequency and duration of the maintenance and/or start-up/shutdown activities, and an estimate of the emission rates of any air contaminants released. Such records shall be maintained for a period of at least five years and made available for review to department representatives upon request. Facility owners or operators subject to continuous stack monitoring and quarterly reporting requirements need not submit additional reports for equipment maintenance or start-up/shutdown activities for the facility to the department.

(c) In the event that emissions of air contaminants in excess of any emission standard in this Subchapter occur due to a malfunction, the facility owner or operator shall compile and maintain records of the malfunction and notify the department as soon as possible during normal working hours, but not later than two working days after becoming aware that the malfunction occurred. When requested by the department, the facility owner or operator shall submit a written report to the department describing the malfunction, the corrective action taken, identification of air contaminants, and an estimate of the emission rates.

(d) The department may also require the owner or operator to include, in reports described under Subdivisions (b) and (c) of this Section, an estimate of the maximum ground level concentration of each air contaminant emitted and the effect of such emissions.

(e) A violation of any applicable emission standard resulting from start-up, shutdown, or malfunction conditions at a permitted or registered facility may not be subject to an enforcement action by the department and/or penalty if the department determines, in its sole discretion, that such a violation was unavoidable. The actions and recordkeeping and reporting requirements listed above must be adhered to in such circumstances.

Condition 59: Unavoidable noncompliance and violations
Effective between the dates of 01/17/2012 and 01/16/2017

Applicable State Requirement:6 NYCRR 201-1.4

Item 59.1:
At the discretion of the commissioner a violation of any applicable emission standard for necessary scheduled equipment maintenance, start-up/shutdown conditions and malfunctions or upsets may be excused if such violations are unavoidable. The following actions and recordkeeping and reporting requirements must be adhered to in such circumstances.

(a) The facility owner and/or operator shall compile and maintain records of all equipment maintenance or start-up/shutdown activities when they can be expected to result in an exceedance of any applicable emission standard, and shall submit a report of such activities to the commissioner's representative when requested to do so in writing or when so required by a condition of a permit issued for the corresponding air contamination source except where conditions elsewhere in this permit which contain more stringent reporting and notification provisions for an applicable requirement, in which case they supercede those stated here. Such reports shall describe why the violation was unavoidable and shall include the time, frequency and duration of the maintenance and/or start-up/shutdown activities and the identification of air contaminants, and the estimated emission rates. If a facility owner and/or operator is subject to continuous stack monitoring and quarterly reporting requirements, he need not submit reports for equipment maintenance or start-up/shutdown for the facility to the commissioner's representative.

(b) In the event that emissions of air contaminants in excess of any emission standard in 6 NYCRR Chapter III Subchapter A occur due to a malfunction, the facility owner and/or operator shall report such malfunction by telephone to the commissioner's representative as soon as possible during normal working hours, but in any event not later than two working days after becoming aware that the malfunction occurred. Within 30 days thereafter, when requested in writing by the commissioner's representative, the facility owner and/or operator shall submit a written report to the commissioner's representative describing the malfunction, the corrective action taken, identification of air contaminants, and an estimate of the emission rates. These reporting requirements are superceded by conditions elsewhere in this permit which contain reporting and notification provisions for applicable requirements more stringent than those above.

(c) The Department may also require the owner and/or operator to include in reports described under (a) and (b) above an estimate of the maximum ground level concentration of each air contaminant emitted and the effect of such emissions depending on the deviation of the malfunction and the air contaminants emitted.

(d) In the event of maintenance, start-up/shutdown or malfunction conditions which result in emissions exceeding any applicable emission standard, the facility owner and/or operator shall take appropriate action to prevent emissions which will result in contravention of any applicable ambient air quality standard. Reasonably available control technology, as determined by the commissioner, shall be applied during any maintenance, start-up/shutdown or malfunction condition subject to this paragraph.

(e) In order to have a violation of a federal regulation (such as a new source performance standard or national emissions standard for hazardous air pollutants) excused, the specific federal regulation must provide for an affirmative defense during start-up, shutdowns, malfunctions or upsets.

Condition 1-33: Compliance Demonstration
Effective between the dates of 08/27/2013 and 01/16/2017

Applicable State Requirement:6 NYCRR 225-3.4

Item 1-33.1:
The Compliance Demonstration activity will be performed for the Facility.

Item 1-33.2:
Compliance Demonstration shall include the following monitoring:

Monitoring Type: RECORD KEEPING/MAINTENANCE PROCEDURES
Monitoring Description:

The owner or operator of this facility from which gasoline, subject to this Subpart, is distributed must maintain records on the gasoline that is delivered to or distributed from such facilities. These records shall include:

(1) The RVP of the gasoline if subject to section 225-3.3 of this Subpart.

(2) A designation of the appropriate time period(s) in which the gasoline is intended to be dispensed to motor vehicles.
(3) Written certification that the gasoline:
(i) conforms with all RVP and oxygen content requirements of this Subpart; and
(ii) is in compliance with all applicable State and Federal regulations which apply during the time period(s) specified pursuant to paragraph (3) of this subdivision.

Persons subject to the above recordkeeping requirements shall provide the following records with gasoline which is distributed from facilities:

(1) A copy of the certification produced for item 3 above.

(2) Documentation of the maximum RVP of the gasoline if the gasoline was subject to section 225-3.3 of this Subpart.
(3) Designation of the appropriate time period(s) in which the gasoline is intended to be dispensed to motor vehicles. (4) Documentation of the shipment quantity and the shipment date of the gasoline being distributed.

Persons required to maintain the records listed above must make the records available for inspection during normal business hours, at the location from which the gasoline was delivered, sold, or dispensed, to the commissioner or his representative and must furnish copies of these records to the commissioner or his or her representative upon request. Such persons shall maintain all records and documentation required to be made or maintained in accordance with this section, including any calculations performed, for at least two years (five years for a Title V facility) from date of delivery.

Monitoring Frequency: AS REQUIRED - SEE PERMIT MONITORING DESCRIPTION
Reporting Requirements: SEMI-ANNUALLY (CALENDAR)
Reports due 30 days after the reporting period.
The initial report is due 1/30/2014.
Subsequent reports are due every 6 calendar month(s).

Emission Unit Matrix - Inwood Terminal

Emission Unit ID	Emission Unit Description	Process ID	Process Description	SCC Code	Source ID	Source Description	Control ID	Control Description	Emission Point ID
1-RACK1	Truck loading rack with 6 bays, 3 of which are used to load distillate (including biodiesel and renewable diesel), 1 of which is used to load gasoline and 2 of which are used to load distillate and/or gasoline.	RDS	Truck loading of distillate. Loading is uncontrolled.	4-04-002-50	RACK1	Truck Rack			
		RGS	Gasoline truck loading. Emissions are controlled by a VRU.	4-04-002-50	RACK1	Truck Rack	VRU01	Vapor Recovery System (including condensers, hooding, and other enclosures)	TRK01
		RGB	Gasoline truck loading controlled by the backup VRU	4-04-002-50	RACK1	Truck Rack	VRU02	Vapor Recovery System (including condensers, hooding, and other enclosures)	TRK02
		FTV	Fugitive emissions from loading trucks controlled by Vacuum Assisted Vapor Reduction System.	4-04-001-54	RACK1	Truck Rack	VACTK	Vacuum Assisted Vapor Reduction System	TRK03
1-TANKS	Five (5) storage tanks of different volumes containing gasoline or petroleum hydrocarbons.	GAS	Five (5) storage tanks, each having a capacity greater than 40,000 gallons storing gasoline. Each tank has a fixed roof with an internal floating roof system.	4-04-001-60	TK004	2,115,695 gallons	FLR04	Floating Roof	00T04
					TK005	1,245,672 gallons	FLR05	Floating Roof	00T05
					TK006	533,432 gallons	FLR06	Floating Roof	00T06
					TK007	658,805 gallons	FLR07	Floating Roof	00T07
					TK010	3,868,130 gallons	FLR10	Floating Roof	00T10
		VOL	Five (5) storage tanks, each having a capacity of greater than 40,000 gallons, storing petroleum hydrocarbons with a maximum true vapor pressure of 11.1 psi. Each thank has a fixed roof with an internal floating roof sysstem.	4-04-001-60	TK004	2,115,695 gallons	FLR04	Floating Roof	00T04
					TK005	1,245,672 gallons	FLR05	Floating Roof	00T05
					TK006	533,432 gallons	FLR06	Floating Roof	00T06
					TK007	658,805 gallons	FLR07	Floating Roof	00T07
					TK010	3,868,130 gallons	FLR10	Floating Roof	00T10
1-FUGTV	Facility wide equipment fugitive emissions	FG1	Miscellaneous fugitive HAP and VOC emissions from valves, pumps, and miscellaneous equipment leakage.	4-04-001-51	FUGTV	Miscellaneous Equipment			EPFUG

Total Project Emission Potential - 3 mg/l VRU with 10,000 bbl per day (153,300,000 gallons per year) increase, vac assist

EMISSION SOURCE	ACTUALS (tpy)					BASELINE EMISSIONS* (tpy)	PROJECTED EMISSIONS (tpy)	PROJECT EMISSION POTENTIAL** (tpy)	PROJECTED THROUGHPUT FOR PEP (gallons)
	2015	2016	2017	2018	2019				
Gasoline Loading Total (See Note 1)	17.056	18.809	17.714	18.018	18.953	18.26	7.55	NA	603,300,000
Tank 4 Working Losses	0.035	0.057	0.040	0.041	0.043	0.05	0.16	0.11	603,300,000
Tank 5 Working Losses	0.084	0.063	0.066	0.067	0.070	0.06	0.10	0.04	
Tank 6 Working Losses	0.030	0.027	0.040	0.042	0.045	0.03	0.06	0.03	
Tank 7 Working Losses	0.049	0.043	0.065	0.068	0.073	0.05	0.10	0.05	
Tank 10 Working Losses	0.180	0.135	0.141	0.143	0.149	0.14	0.22	0.08	
TOTAL:	17.433	19.134	18.066	18.377	19.331	18.60	8.19	0.30	
						Project Emission Potential		**0.30**	**tpy**

* Baseline Emissions are the average of 2016 and 2017

** PEP using 3 mg/L, with vac assist.

Notes:

1. Loading actuals use an emission rate of 5.25 mg/l based on the 2019 stack test and include fugitive emissions. Projected emissions include loading with no fugitive emissions due to vac assist.

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List of Exempt Activities

Instructions

Applicants for Title V facility permits must provide a listing of each exempt activity, as described in 6 NYCRR Part 201-3.2(c), that is currently operated at the facility. This form must be provided with each application for a new Title V facility permit and Title V facility permit renewal, or whenever changes are necessary. In order to complete this form, enter the number and building location of each exempt activity conducted. Building IDs used on this form should match those used in the Title V permit application. Provide all additional information where requested. If a listed activity is not operated at the facility, leave the corresponding information blank.

Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
	Combustion		
(1)	Stationary or portable combustion installations where the furnace has a maximum rated heat input capacity less than 10 MMBtu/hr burning liquid or gaseous fuels; or a maximum heat input capacity of less than 1 MMBtu/hr burning solid fuels. This activity does not include combustion installations burning any material classified as solid waste, as defined in 6 NYCRR Part 360, hazardous waste, as defined in 6 NYCRR Part 371, or waste oil, as defined in 6 NYCRR Subpart 225-2. **For each activity listed, attach documentation indicating the date of construction, heat input (MMBtu/hr), and the type of fuel combusted.**	1	
(2)	Space heaters burning waste oil at eligible facilities, as defined in 6 NYCRR Subpart 225-2, generated on-site or at a facility under common control, alone or in conjunction with used oil generated by a do-it-yourself oil changer as described in 6 NYCRR Subpart 374-2.		
(3)(i)	Stationary or portable internal combustion engines that are liquid or gaseous fuel powered and located within the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury, and have a maximum mechanical power rating of less than 200 brake horsepower. **For each activity listed, attach documentation indicating the date of construction, engine model year, engine rating (hp), displacement (L/cylinder), type of fuel combusted, and EPA issued certificate of conformity.**	2	

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(3)(ii)	Stationary or portable internal combustion engines that are liquid or gaseous fuel powered and located outside of the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury, and have a maximum mechanical power rating of less than 400 brake horsepower. **For each activity listed, attach documentation indicating the date of construction, engine model year, engine rating (hp), displacement (L/cylinder), type of fuel combusted, and EPA issued certificate of conformity.**		
(3)(iii)	Stationary or portable internal combustion engines that are gasoline powered and have a maximum mechanical power rating of less than 50 brake horsepower.		
(4)	Reserved.		
(5)	Gas turbines with a heat input at peak load less then 10 MMBtu/hour		
(6)	Emergency power generating stationary internal combustion engines, as defined in 6 NYCRR Part 200.1(cq). Stationary internal combustion engines used for peak shaving and/or demand response programs are not exempt. **For each activity listed, attach documentation indicating the date of construction, engine model year, engine rating (hp), displacement (L/cylinder), type of fuel combusted, and EPA issued certificate of conformity.**		
Combustion Related			
(7)	Non-contact water cooling towers and water treatment systems for process cooling water and other water containers designed to cool, store or otherwise handle water that has not been in direct contact with gaseous or liquid process streams.		
Agricultural			
(8)	Feed and grain milling, cleaning, conveying, drying and storage operations including grain storage silos, where such silos exhaust to an appropriate emissions control device, excluding grain terminal elevators with permanent storage capacities over 2.5 million U.S. bushels, and grain storage elevators with capacities above one million bushels.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(9)	Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment.		
Commercial - Food Service Industries			
(10)	Flour silos at bakeries, provided all such silos are exhausted through an appropriate emission control device.		
(11)	Emissions from flavorings added to a food product where such flavors are manually added to the product.		
Commercial - Graphic Arts			
(12)	Screen printing inks/coatings or adhesives which are applied by a hand-held squeegee. A hand-held squeegee is one that is not propelled though the use of mechanical conveyance and is not an integral part of the screen printing process.		
(13)	Graphic arts processes at facilities located outside the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury whose facility-wide total emissions of volatile organic compounds from inks, coatings, adhesives, fountain solutions and cleaning solutions are less than three tons during any 12-month period.		
(14)	Graphic label and/or box labeling operations where the inks are applied by stamping or rolling.		
(15)	Graphic arts processes which are specifically exempted from regulation under 6 NYCRR Part 234, with respect to emissions of volatile organic compounds which are not given an A rating as described in 6 NYCRR Part 212.		
Commercial - Other			
(16)	Gasoline dispensing sites registered with the department pursuant to 6 NYCRR Part 613.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(17)	Surface coating and related activities at facilities which use less than 25 gallons per month of total coating materials, or with actual volatile organic compound emissions of 1,000 pounds or less from coating materials in any 12-month period. Coating materials include all paints and paint components, other materials mixed with paints prior to application, and cleaning solvents, combined. This exemption is subject to the following: (i) The facility is located outside of the New York City metropolitan area or the Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, or Woodbury; and (ii) All abrasive cleaning and surface coating operations are performed in an enclosed building where such operations are exhausted into appropriate emission control devices.		
(18)	Abrasive cleaning operations which exhaust to an appropriate emission control device.		
(19)	Ultraviolet curing operations.		
Municipal/Public Health Related			
(20)	Landfill gas ventilating systems at landfills with design capacities less than 2.5 million megagrams (3.3 million tons) and 2.5 million cubic meters (2.75 million cubic yards), where the systems are vented directly to the atmosphere, and the ventilating system has been required by, and is operating under, the conditions of a valid 6 NYCRR Part 360 permit, or order on consent.		
Storage Vessels			
(21)	Distillate fuel oil, residual fuel oil, and biodiesel storage tanks with storage capacities below 300,000 barrels.	5	N/A
(22)	Pressurized fixed roof tanks which are capable of maintaining a working pressure at all times to prevent emissions of volatile organic compounds to the outdoor atmosphere.		
(23)	External floating roof tanks which are of welded construction and are equipped with a metallic-type shoe primary seal and a secondary seal from the top of the shoe seal to the tank wall.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(24)	External floating roof tanks which are used for the storage of a petroleum or volatile organic liquid with a true vapor pressure less than 4.0 psi (27.6 kPa), are of welded construction and are equipped with one of the following: (i) a metallic-type shoe seal; (ii) a liquid-mounted foam seal; (iii) a liquid-mounted liquid-filled type seal; or (iv) equivalent control equipment or device.		
(25)	Storage tanks, including petroleum liquid storage tanks as defined in 6 NYCRR Part 229, and liquid asphalt storage tanks with capacities less than 10,000 gallons, except those subject to 6 NYCRR Part 229 or Part 233.		
(26)	Horizontal petroleum or volatile organic liquid storage tanks.	8	
(27)	Storage of solid materials, provided all such storage is exhausted through an appropriate emission control device. This exemption does not include raw material, clinker, or finished product storage at Portland cement plants.		
Industrial			
(28)	Processing equipment at existing sand and gravel and stone crushing plants which were installed or constructed before August 31, 1983, where water is used for operations such as wet conveying, separating, and washing. This exemption does not include processing equipment at existing sand and gravel and stone crushing plants where water is used for dust suppression.		
(29)(i)	Sand and gravel, crushed stone, concrete, or recycled asphalt processing lines at non-metallic mineral processing facilities that are a permanent or fixed installation with a maximum rated processing capacity of 25 tons of minerals per hour or less.		
(29)(ii)	Sand and gravel, crushed stone, concrete, or recycled asphalt processing lines at non-metallic mineral processing facilities that are a portable emission source with a maximum rated processing capacity of 150 tons of minerals per hour or less.		

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(29)(iii)	Sand and gravel, crushed stone, concrete, or recycled asphalt processing lines at non-metallic mineral processing facilities that are used exclusively to screen minerals at a facility where no crushing or grinding takes place.		
(30)	Reserved.		
(31)	Surface coating operations which are specifically exempted from regulation under 6 NYCRR Subparts 228-1 and 228-2, with respect to emissions of volatile organic compounds which are not given an A rating pursuant to 6 NYCRR Part 212.		
(32)	Pharmaceutical tablet branding operations.		
(33)	Thermal packaging operations, including, but not limited to, therimage labeling, blister packing, shrink wrapping, shrink banding, and carton gluing.		
(34)	Powder coating operations.		
(35)	All tumblers used for the cleaning and/or deburring of metal products without abrasive blasting.		
(36)	Presses used exclusively for molding or extruding plastics except where halogenated polymers are used or where halogenated carbon compounds or hydrocarbon solvents are used as foaming agents.		
(37)	Concrete batch plants where the cement weigh hopper and all bulk storage silos are exhausted through fabric filters, and the batch drop point is controlled by a shroud or other emission control device.		
(38)	Cement storage operations not located at Portland cement plants where materials are transported by screw or bucket conveyors.		
(39)(i)	Cold cleaning degreasers with an open surface area of 11 square feet or less and an internal volume of 93 gallons or less or, having an organic solvent loss of 3 gallons per day or less.		
39(ii)	Conveyorized degreasers with an air/vapor interface smaller than 22 square feet (2 square meters), unless subject to the requirements of 40 CFR 63 Subpart T.		
(39)(iii)	Open-top vapor degreasers with an open-top area smaller than 11 square feet (1.0 square meter), unless subject to the requirements in 40 CFR 63, Subpart T.		
Miscellaneous			
(40)	Ventilating and exhaust systems for laboratory operations. This exemption does not include laboratory operations used to produce products for sale except in a de minimis manner.	1	

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Rule Citation 201-3.2(c)	Description	Number of Activities	Building Location
(41)	Exhaust or ventilating systems for the melting of gold, silver, platinum and other precious metals.		
(42)	Exhaust systems for paint mixing, transfer, filling or sampling and/or paint storage rooms or cabinets, provided the paints stored within these locations are stored in closed containers when not in use.		
(43)	Exhaust systems for solvent transfer, filling or sampling, and/or solvent storage rooms provided the solvents are stored in closed containers when not in use.		
(44)	Reserved		
(45)	The application of odor counteractants and/or neutralizers.		
(46)	Hydrogen, natural gas, and methane fuel cells.		
(47)	Dry cleaning equipment that uses only water-based cleaning processes or those using liquid carbon dioxide.		
(48)	Manure spreading, handling and storage at farms and agricultural facilities.		
(49)	Covered manure storage at farms that exhausts to a flare or other appropriate emission control device. This activity does not include anaerobic digestion processes operating with or without stationary or portable combustion installations.		
(50)	Coffee roasting processes which have a maximum operating capacity of 3 kilograms or less of green coffee beans per batch and no greater than 25 tons of green coffee beans per year, that are vented through an unobstructed, vertical stack that ensures proper dispersion of air contaminants.		
(51)	Process emission sources at breweries with total combined beer and/or malt liquor production of 60,000 barrels per year or less.		
(52)	Process emission sources at wineries with total combined wine and/or brandy production of 700,000 gallons per year or less.		
(53)	Process emission sources at distilleries with 10,000 distiller's bushels of grain input per year or less.		
(54)	Process emission sources at wood and lumber drying kilns with an annual throughput of untreated wood of 275,000 board feet or less.		

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Methods Used to Determine Compliance			
Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	6 NYCRR 200.6	Emissions do not contravene any applicable ambient air quality standard and/or cause air pollution.	In compliance as of 6/30/2021
FACILITY	6 NYCRR 200.7	Daily and monthly VCU inspections, preventative maintenance records	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-1.7	There are no air cleaning devices installed at the facility	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-1.8	Wastes generated from air cleaning devices are managed in accordance with NYSDEC rules regarding hazardous and non hazardous wastes	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-3.2(a)	An Exempt and Trivial Source Inventory is maintained with the Air Permit	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-3.3(a)	Trivial Activities are documented in the exempt Source Inventory maintained with the Air Permit	In compliance as of 6/30/2021
FACILITY	6 NYCRR Subpart 201-6	Review permit emission unit definitions, process descriptions, and emissions points for accuracy	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(a)(4)	Information requests are provided to the department in writing within reasonable time frame.	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(a)(7)	Accounting System	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(a)(8)	Global will allow access to the Department or authorized representative	In compliance as of 6/30/2021

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Methods Used to Determine Compliance			
Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	6 NYCRR 201-6.4(c)	Included in the required monitoring reports. Any deviations are reported in semi annual reports.	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(c)(2)	Specific records kept include VCU Inspection Records / Annual and Semi Annual Reports, throughput records, Certificates of Analyses, Annual Emissions Statements, Bills of Lading	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(c)(3)(ii)	Semiannual Monitoring and Deviation Reports	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(d)(4)	Progress reports associated with a Schedule of Compliance submitted at least semi annually (if applicable)	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(e)	Annual Compliance Report and Certification	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-6.4(f)(6)	Submit 7 days advance notice for any off permit changes	In compliance as of 6/30/2021

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Methods Used to Determine Compliance			
Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	6 NYCRR 201-7.1(a)	Monthly rolling VOC emission calculations	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-7.1(a)	Emission calculations, annual Emissions Statement	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-7.1(a)	Monthly rolling throughput records	In compliance as of 6/30/2021
1-RACK1, RGS	6 NYCRR 201-7.1(a)	Emissions calculations, annual Emissions Statement, VRU Performance Tests	In compliance as of 6/30/2021
1-RACK1, 00001, RDS	6 NYCRR 201-7.1(a)	Monthly rolling throughput records	In compliance as of 6/30/2021
1-RACK1, 00001, RGS	6 NYCRR 201-7.1(a)	Monthly rolling throughput records	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-7.1(a)	Emissions calculations, annual Emissions Statement	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-7.1(a)	Monthly rolling throughput records, Emissions calculations, Annual Emissions Statement	In compliance as of 6/30/2021
FACILITY	6 NYCRR 202-1.1	Performance Test Report Submittal	In compliance as of 6/30/2021
FACILITY	6 NYCRR 202-2.1	Annual Emission Statement Submittal	In compliance as of 6/30/2021

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Methods Used to Determine Compliance			
Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	6 NYCRR 202-2.5	Emissions Statement and supporting documents are available for >5 years.	In compliance as of 6/30/2021
FACILITY	6 NYCRR 211.1	Compliance with permit emission limitations ensure compliance with this requirement	In compliance as of 6/30/2021
FACILITY	6 NYCRR 211.1	Contact information is posted at the main entrance. Call box is located at main entrance.	In compliance as of 6/30/2021
1-RACK1, RDS	6 NYCRR 212.10(c)(1)	A Vapor Recovery Unit is installed on the rack, and gasoline/ethanol storage tanks are equipped with internal floating roofs	In compliance as of 6/30/2021
1-RACK1, RDS, RACK1	6 NYCRR 212.10(c)(1)	A Vapor Recovery Unit is installed on the rack, and gasoline/ethanol storage tanks are equipped with internal floating roofs	In compliance as of 6/30/2021
FACILITY	6 NYCRR 215.2	Open burning is prohibited	In compliance as of 6/30/2021
FACILITY	6 NYCRR 225-1.2	Certificates of Analysis / Product oversight program / Terminal Operator Training	In compliance as of 6/30/2021
FACILITY	6 NYCRR 225-1.6	Certificates of Analysis, Semi-Annual Report	In compliance as of 6/30/2021
FACILITY	6 NYCRR 225-3.3(a)	Certificates of Analysis	In compliance as of 6/30/2021

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Methods Used to Determine Compliance

Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	6 NYCRR 225-3.4(a)	Bills of Lading maintained for >5 years at the Terminal	In compliance as of 6/30/2021
FACILITY	6 NYCRR 229.3(a)	Tanks subject to this section are fitted with appropriate controls	In compliance as of 6/30/2021
1-TANKS	6 NYCRR 229.3(e)(1)	Tank inspection records, IFR Inspection Reports	In compliance as of 6/30/2021
FACILITY	6 NYCRR 229.5	Facility Tank and Throughput Records	In compliance as of 6/30/2021
FACILITY	40 CFR 60.7 (a)	Notifications are sent as required	In compliance as of 6/30/2021
1-TANKS, GAS, TK010	40 CFR 60.112b(a)(1)	Global provided ExxonMobil (the owner at the time) certification that the IFRs comply with 40 CFR 60.112b(a)(1) with a notification letter on November 29, 2007	In compliance as of 6/30/2021
1-TANKS, VOL, TK010	40 CFR 60.112b(a)(1)	Global provided ExxonMobil (the owner at the time) certification that the IFRs comply with 40 CFR 60.112b(a)(1) with a notification letter on November 29, 2007	In compliance as of 6/30/2021
FACILITY	40 CFR 60.113b(a)	Facility Tank Records and inspection forms	In compliance as of 6/30/2021
FACILITY	40 CFR 60.115b(a)	Internal Floating Roof Hatch Inspection Reports, Tank inspection forms (monthly and annually)	In compliance as of 6/30/2021
FACILITY	40 CFR 60.116b	The facility retains records of tank dimensions and capacity for the life of the vessel.	In compliance as of 6/30/2021

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Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	40 CFR 60.502	Vapor collection system inspections and truck documentation	In compliance as of 6/30/2021
1-RACK1, RGS, RACK1	40 CFR 60.505(b)	Tank Truck Tightness Records	In compliance as of 6/30/2021
1-RACK1, RGS, RACK1	40 CFR 60.505(c)	Monthly Rack Inspection Form, Facility Monthly Inspection Form.	In compliance as of 6/30/2021
1-RACK1, RGS, RACK1	40 CFR 60.505(f)	Monthly Rack Inspection Form, and repair work orders	In compliance as of 6/30/2021
1-RACK1	40 CFR 63.11088	VRU Inspections, preventative maintenance records, VRU performance Tests, Tank Truck Tightness Records	In compliance as of 6/30/2021
FACILITY	40 CFR 63.11089	Monthly Inspection Forms	In compliance as of 6/30/2021
1-RACK1	40 CFR 63.11092(a)	VRU Performance tests	In compliance as of 6/30/2021
1-TANKS	40 CFR 63.11092(e)(1)	Roof hatch inspection forms	In compliance as of 6/30/2021
1-RACK1, RGS, VPORS	40 CFR Part 64	Daily VRU inspection records, Quarterly Preventative Maintenance Reports, Monthly EPA 21 Stack Test Records. VRU Performance Tests.	In compliance as of 6/30/2021
FACILITY	40 CFR Part 68	Fuels are exempt from program and no other chemicals are utilized which exceed threshold	In compliance as of 6/30/2021

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Methods Used to Determine Compliance			
Emission Unit ID	Applicable Requirement	Method Used to Determine Compliance	Compliance Date
FACILITY	40 CFR Part 82, Subpart F	Only Certified Contractors are used to work on refrigerant systems	In compliance as of 6/30/2021
FACILITY	ECL 19-0301	Review emissions inventory	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-1.4	Violations can be excused by NYSDEC if the facility is able to prove unavoidability.	In compliance as of 6/30/2021
FACILITY	6 NYCRR 201-1.4	Violations can be excused by NYSDEC if the facility is able to prove unavoidability.	In compliance as of 6/30/2021
FACILITY	6 NYCRR 225-3.4	Bills of Lading maintained for > 5 years (Maintained at Terminal)	In compliance as of 6/30/2021
FACILITY	6 NYCRR 212	Air emission modeling submitted as part of Title V Permit Renewal	In compliance as of 6/30/2021

Total Facility Summary:

Pollutant	Tank Emissions (TPY)	Loading Emissions (TPY)	Fugitive Emissions (TPY)	Total (TPY)*
VOC	36.67	8.97	0.14	45.790
Total HAP	1.39	0.29	0.02	1.697
hexane	0.17	0.03	0.00	0.204
benzene	0.20	0.04	0.00	0.238
2,2,4 TMP	0.24	0.04	0.00	0.279
toluene	0.31	0.07	0.01	0.387
ethylbenzene	0.07	0.01	0.00	0.077
xylenes	0.36	0.09	0.01	0.457
cumene	0.01	0.00	0.00	0.007
naphthalene	0.00	0.00	0.00	0.005
methanol	0.04	-	-	0.043

* = Includes VOCs from Combustion

SUMMARY OF TANK EMISSIONS

SUMMARY OF VOC EMISSIONS				SUMMARY PER MONTH											
Tank ID				January	February	March	April	May	June	July	August	September	October	November	December
ROUTINE	lb/yr	tpy	lb/hr	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month
IFR Tanks															
4	14,692	7.35	1.68	838.31	875.74	1,046.63	1,356.25	933.24	1,177.42	1,341.13	1,305.64	2,151.86	1,542.29	1,188.43	935.24
5	11,443	5.72	1.31	653.13	682.26	815.25	1,056.21	727.01	917.04	1,044.45	1,016.83	1,675.38	1,200.99	925.61	728.56
6	6,475	3.24	0.74	369.93	386.38	461.49	597.58	411.65	518.98	590.93	575.34	947.27	679.35	523.82	412.53
7	6,855	3.43	0.78	391.90	409.29	488.70	632.56	436.01	549.47	625.54	609.05	1,002.25	719.01	554.59	436.94
10	12,899	6.45	1.47	714.08	755.17	914.48	1,205.35	836.18	1,060.43	1,206.47	1,162.72	1,909.16	1,332.57	1,009.68	792.34
SubTotal	52,364	26.18	5.98												
FRT Tanks - Distillate															
1	122	0.06	0.01	3.94	4.07	5.98	8.59	12.29	16.26	19.35	18.14	13.71	9.34	6.20	4.51
2	236	0.12	0.03	7.58	7.82	11.52	16.56	23.72	31.37	37.33	34.99	26.40	17.99	11.91	8.68
3	248	0.12	0.03	7.99	8.25	12.13	17.42	24.93	32.98	39.24	36.78	27.79	18.94	12.56	9.15
9	3,337	1.67	0.381	117.29	116.99	166.23	230.88	323.31	423.70	507.14	485.27	378.71	267.66	184.07	135.76
8*	678	0.34	0.077	23.87	23.85	33.78	46.92	65.64	86.10	103.01	98.61	77.04	54.43	37.50	27.64
FRT Tanks - Heated Biodiesel															
8*	618	0.31	0.071	52.34	48.16	52.34	50.94	52.34	50.94	52.34	52.34	50.94	52.34	50.94	52.34
SubTotal	4,622	2.31	0.53												
Horizontal Tanks															
11	3	0.00	0.00	0.10	0.11	0.15	0.23	0.33	0.44	0.52	0.49	0.38	0.25	0.17	0.12
12	42	0.02	0.00	1.27	1.39	1.97	2.94	4.19	5.67	6.67	6.27	4.85	3.23	2.13	1.48
14	36	0.02	0.00	1.08	1.19	1.70	2.56	3.66	4.94	5.81	5.44	4.18	2.78	1.81	1.25
15	74	0.04	0.01	1.29	1.70	3.15	5.47	8.75	12.04	14.06	12.06	7.82	4.37	2.15	1.36
20	78	0.04	0.01	1.29	1.72	3.27	5.74	9.26	12.76	14.89	12.69	8.13	4.47	2.14	1.34
18	3	0.00	0.00	0.08	0.10	0.15	0.25	0.37	0.51	0.60	0.54	0.38	0.23	0.13	0.09
19	69	0.03	0.01	1.52	1.86	3.04	5.02	7.70	10.63	12.41	10.96	7.56	4.48	2.55	1.69
SubTotal	306	0.15	0.03												
TOTAL ROUTINE	57,292	28.65	6.54												
LANDINGS															
IFR Tanks				lb/month											
4	4,654	2.327	0.53	4653.7											
5	2,618	1.309	0.30	2617.7											
6	100	0.050	0.01	100.2											
7	1,408	0.704	0.16	1407.7											
10	7,271	3.636	0.83	7271.4											

	LB/YR	TPY	LB/HR
IFR Tanks			
4	**19,346**	**9.67**	**2.21**
5	**14,060**	**7.03**	**1.61**
6	**6,575**	**3.29**	**0.75**
7	**8,263**	**4.13**	**0.94**
10	**20,170**	**10.09**	**2.30**
FRT Tanks			
1	**122**	**0.06**	**0.01**
2	**236**	**0.12**	**0.03**
3	**248**	**0.12**	**0.03**
9	**3,337**	**1.67**	**0.38**
8	**678**	**0.34**	**0.08**
Horizontal Tanks			
HT Total	**306**	**0.15**	**0.03**
Total	**73,343**	**36.67**	**8.37**

* = worst-case emissions for total VOCs and HAPs are assumed for tank 8 based on either distillate fuel oil No. 2 or heated biodiesel.

SUMMARY OF HAP EMISSIONS										
Tank ID	Total HAPS	hexane	benzene	2,2,4 TMP	toluene	ethylbenzene	xylenes	cumene	naphthalene	methanol
	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr	lb/yr
ROUTINE EMISSIONS										
IFR Tanks										
4	394.5	65.89	75.32	92.36	101.22	9.79	45.85	2.57	1.50	0.00
5	309.0	51.37	58.77	72.22	79.38	7.74	36.30	2.04	1.20	0.00
6	177.5	29.14	33.42	41.30	45.72	4.55	21.38	1.22	0.73	0.00
7	189.9	30.90	35.51	44.05	49.03	4.95	23.30	1.34	0.81	0.00
10	387.0	60.00	69.86	88.50	101.24	10.87	51.54	3.04	1.94	0.00
SubTotal	1457.86	237.29	272.89	338.43	376.58	37.90	178.37	10.21	6.19	0.00
FRT Tanks										
1	10.80	0.05	0.25	0.00	2.84	0.37	7.24	0.00	0.05	0.00
2	20.82	0.10	0.47	0.00	5.48	0.72	13.95	0.00	0.10	0.00
3	21.91	0.10	0.50	0.00	5.77	0.75	14.68	0.00	0.11	0.00
9	293.83	1.39	6.84	0.00	78.13	10.07	195.97	0.00	1.42	0.00
8 - Heated Biodiesel*	86.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.49
8 - Distillate*	59.73	0.28	1.39	0.00	15.88	2.05	39.84	0.00	0.29	0.00
SubTotal	493.58	1.92	9.46	0.00	108.11	13.96	271.67	0.00	1.97	86.49
Horizontal Tanks										
11	3.28	0.00	0.00	0.00	0.00	0.84	2.44	0.00	0.00	0.00
12	42.07	0.00	0.00	0.00	0.00	10.73	31.34	0.00	0.00	0.00
14	36.40	0.00	0.00	0.00	0.00	9.29	27.11	0.00	0.00	0.00
15	74.22	0.00	0.00	0.00	0.00	18.90	55.33	0.00	0.00	0.00
20	77.70	0.00	0.00	0.00	0.00	19.78	57.92	0.00	0.00	0.00
18	3.43	0.00	0.00	0.00	0.00	0.87	2.55	0.00	0.00	0.00
19	69.40	0.00	0.00	0.00	0.00	17.67	51.73	0.00	0.00	0.00
SubTotal	306.49	0.00	0.00	0.00	0.00	78.07	228.42	0.00	0.00	0.00
TOTAL ROUTINE	2257.94	239.22	282.34	338.43	484.69	129.94	678.46	10.21	8.16	86.49
LANDING EMISSIONS (LB/YR)										
Tank ID	**Total HAPS**	**hexane**	**benzene**	**2,2,4 TMP**	**toluene**	**ethylbenzene**	**xylenes**	**cumene**	**naphthalene**	**methanol**
IFR Tanks										
4	153.49	29.16	33.11	38.19	38.63	2.59	11.33	0.45	0.02	0.00
5	86.34	16.40	18.63	21.48	21.73	1.46	6.37	0.25	0.01	0.00
6	3.31	0.63	0.71	0.82	0.83	0.06	0.24	0.01	0.00	0.00
7	46.43	8.82	10.02	11.55	11.69	0.78	3.43	0.14	0.01	0.00
10	239.82	45.57	51.74	59.68	60.36	4.04	17.70	0.70	0.03	0.00
Total LANDING	529.38	100.59	114.21	131.73	133.24	8.92	39.07	1.54	0.07	0.00
TOTAL TANK										
	Total HAPS	**hexane**	**benzene**	**2,2,4 TMP**	**toluene**	**ethylbenzene**	**xylenes**	**cumene**	**naphthalene**	**methanol**
Total (lb/yr)	**2,787**	**340**	**397**	**470**	**618**	**139**	**718**	**12**	**8**	**86**
Total (tpy)	1.39	0.17	0.20	0.24	0.31	0.07	0.36	0.01	0.00	0.04
Total (lb/hr)	0.32	0.04	0.05	0.05	0.07	0.02	0.08	0.00	0.00	0.01

* = worst-case emissions for total VOCs and HAPs are assumed for tank 8 based on either distillate fuel oil No. 2 or heated biodiesel.

SUMMARY OF ROUTINE TANK EMISSIONS

SUMMARY OF VOC EMISSIONS				SUMMARY PER MONTH											
Tank ID				January	February	March	April	May	June	July	August	September	October	November	December
ROUTINE	lb/yr	tpy	lb/hr	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month	lb/month
IFR Tanks															
4															
Total	14,692	7.35	1.68	838.31	875.74	1,046.63	1,356.25	933.24	1,177.42	1,341.13	1,305.64	2,151.86	1,542.29	1,188.43	935.24
Standing	14,340	7.17	1.64	808.94	846.37	1,017.26	1,326.88	903.87	1,148.05	1,311.76	1,276.27	2,122.49	1,512.92	1,159.06	905.87
Working	352	0.18	0.04	29.37	29.37	29.37	29.37	29.37	29.37	29.37	29.37	29.37	29.37	29.37	29.37
5															
Total	11,443	5.72	1.31	653.13	682.26	815.25	1,056.21	727.01	917.04	1,044.45	1,016.83	1,675.38	1,200.99	925.61	728.56
Standing	11,160	5.58	1.27	629.54	658.67	791.67	1,032.62	703.42	893.46	1,020.86	993.24	1,651.80	1,177.41	902.02	704.98
Working	283	0.14	0.03	23.59	23.59	23.59	23.59	23.59	23.59	23.59	23.59	23.59	23.59	23.59	23.59
6															
Total	6,475	3.24	0.74	369.93	386.38	461.49	597.58	411.65	518.98	590.93	575.34	947.27	679.35	523.82	412.53
Standing	6,303	3.15	0.72	355.55	372.00	447.12	583.20	397.28	504.60	576.56	560.96	932.90	664.97	509.44	398.16
Working	173	0.09	0.02	14.38	14.38	14.38	14.38	14.38	14.38	14.38	14.38	14.38	14.38	14.38	14.38
7															
Total	6,855	3.43	0.78	391.90	409.29	488.70	632.56	436.01	549.47	625.54	609.05	1,002.25	719.01	554.59	436.94
Standing	6,663	3.33	0.76	375.88	393.27	472.68	616.54	419.99	533.45	609.52	593.03	986.23	702.99	538.56	420.92
Working	192	0.10	0.02	16.02	16.02	16.02	16.02	16.02	16.02	16.02	16.02	16.02	16.02	16.02	16.02
10															
Total	12,899	6.45	1.47	714.08	755.17	914.48	1,205.35	836.18	1,060.43	1,206.47	1,162.72	1,909.16	1,332.57	1,009.68	792.34
Standing	12,439	6.22	1.42	675.75	716.85	876.15	1,167.03	797.85	1,022.11	1,168.15	1,124.40	1,870.84	1,294.25	971.36	754.02
Working	460	0.23	0.05	38.32	38.32	38.32	38.32	38.32	38.32	38.32	38.32	38.32	38.32	38.32	38.32
SubTotal	52,364	26.18	5.98												
FRT Tanks - Distillate															
1															
Total	122	0.06	0.01	3.94	4.07	5.98	8.59	12.29	16.26	19.35	18.14	13.71	9.34	6.20	4.51
Standing	25	0.01	0.00	0.55	0.67	1.16	1.88	2.88	3.83	4.46	3.91	2.67	1.62	0.87	0.58
Working	97	0.05	0.01	3.39	3.40	4.82	6.71	9.41	12.43	14.89	14.23	11.03	7.72	5.33	3.93
2															
Total	236	0.12	0.03	7.58	7.82	11.52	16.56	23.72	31.37	37.33	34.99	26.40	17.99	11.91	8.68
Standing	49	0.02	0.01	1.08	1.32	2.28	3.71	5.68	7.56	8.80	7.71	5.27	3.19	1.71	1.15
Working	186	0.09	0.02	6.50	6.50	9.24	12.86	18.04	23.81	28.54	27.27	21.13	14.80	10.20	7.53
3															
Total	248	0.12	0.03	7.99	8.25	12.13	17.42	24.93	32.98	39.24	36.78	27.79	18.94	12.56	9.15
Standing	51	0.03	0.01	1.11	1.35	2.35	3.81	5.84	7.77	9.05	7.93	5.42	3.28	1.76	1.18
Working	197	0.10	0.02	6.87	6.89	9.78	13.61	19.09	25.20	30.19	28.85	22.37	15.66	10.80	7.97
9															
Total	3,337	1.67	0.381	117.29	116.99	166.23	230.88	323.31	423.70	507.14	485.27	378.71	267.66	184.07	135.76
Standing	438	0.22	0.05	11.15	12.87	21.22	33.15	49.14	63.45	73.35	65.55	47.56	31.00	17.42	11.87
Working	2,899	1.45	0.33	106.14	104.12	145.01	197.74	274.18	360.25	433.79	419.72	331.16	236.66	166.65	123.89
8															
Total	678	0.34	0.077	23.87	23.85	33.78	46.92	65.64	86.10	103.01	98.61	77.04	54.43	37.50	27.64
Standing	85	0.04	0.01	2.17	2.51	4.14	6.46	9.59	12.38	14.32	12.80	9.28	6.05	3.40	2.31
Working	593	0.30	0.07	21.70	21.34	29.65	40.46	56.06	73.71	88.69	85.81	67.76	48.38	34.10	25.33
FRT Tanks - Heated Biodiesel															
8															
Total	618	0.31	0.071	52.34	48.16	52.34	50.94	52.34	50.94	52.34	52.34	50.94	52.34	50.94	52.34
Standing	86	0.04	0.01	7.35	6.63	7.35	7.11	7.35	7.11	7.35	7.35	7.11	7.35	7.11	7.35
Working	532	0.27	0.06	44.99	41.52	44.99	43.84	44.99	43.84	44.99	44.99	43.84	44.99	43.84	44.99
SubTotal	4,622	2.31	0.53												
Horizontal Tanks															
11															
Total	3	0.00	0.00	0.10	0.11	0.15	0.23	0.33	0.44	0.52	0.49	0.38	0.25	0.17	0.12
Standing	1	0.00	0.00	0.02	0.03	0.05	0.07	0.11	0.15	0.17	0.15	0.11	0.07	0.04	0.03
Working	2	0.00	0.00	0.08	0.08	0.11	0.15	0.21	0.29	0.34	0.33	0.27	0.18	0.13	0.09
12															
Total	42	0.02	0.00	1.27	1.39	1.97	2.94	4.19	5.67	6.67	6.27	4.85	3.23	2.13	1.48
Standing	14	0.01	0.00	0.32	0.37	0.63	1.02	1.54	2.03	2.36	2.11	1.51	0.96	0.53	0.35
Working	28	0.01	0.00	0.95	1.02	1.34	1.93	2.65	3.65	4.31	4.16	3.34	2.27	1.60	1.13
14															
Total	36	0.02	0.00	1.08	1.19	1.70	2.56	3.66	4.94	5.81	5.44	4.18	2.78	1.81	1.25
Standing	14	0.01	0.00	0.32	0.37	0.63	1.02	1.54	2.03	2.36	2.11	1.51	0.96	0.53	0.35
Working	23	0.01	0.00	0.76	0.82	1.07	1.54	2.12	2.92	3.45	3.33	2.67	1.81	1.28	0.90
15															
Total	74	0.04	0.01	1.29	1.70	3.15	5.47	8.75	12.04	14.06	12.06	7.82	4.37	2.15	1.36
Standing	71	0.04	0.01	1.19	1.58	2.99	5.23	8.42	11.57	13.52	11.54	7.42	4.11	1.97	1.24
Working	3	0.00	0.00	0.10	0.12	0.16	0.24	0.34	0.47	0.55	0.52	0.40	0.26	0.18	0.12
20															
Total	78	0.04	0.01	1.29	1.72	3.27	5.74	9.26	12.76	14.89	12.69	8.13	4.47	2.14	1.34
Standing	77	0.04	0.01	1.26	1.69	3.22	5.67	9.15	12.61	14.72	12.53	8.00	4.39	2.09	1.31
Working	1	0.00	0.00	0.03	0.04	0.05	0.07	0.10	0.14	0.17	0.16	0.12	0.08	0.05	0.04
18															
Total	3	0.00	0.00	0.08	0.10	0.15	0.25	0.37	0.51	0.60	0.54	0.38	0.23	0.13	0.09
Standing	2	0.00	0.00	0.03	0.04	0.07	0.12	0.20	0.27	0.32	0.27	0.17	0.10	0.05	0.03
Working	2	0.00	0.00	0.05	0.06	0.08	0.12	0.17	0.24	0.28	0.26	0.20	0.13	0.09	0.06
19															
Total	69	0.03	0.01	1.52	1.86	3.04	5.02	7.70	10.63	12.41	10.96	7.56	4.48	2.55	1.69
Standing	41	0.02	0.00	0.68	0.91	1.73	3.05	4.93	6.79	7.93	6.75	4.31	2.37	1.13	0.70
Working	28	0.01	0.00	0.85	0.95	1.31	1.96	2.77	3.84	4.48	4.21	3.25	2.11	1.42	0.99
SubTotal	306	0.15	0.03												
TOTAL ROUTINE	57,292	28.65	6.54												

Tank No.	4	5	6	7	10
Tank Diam	100	75	50	55	125
Heel Height	4.0	4.0	4.0	4.0	4.0
Volume ft3	31,416	17,671	7,854	9,503	49,087
Vol bbl	5,596	3,148	1,399	1,693	8,743
Volume gal	235,022	132,200	58,756	71,094	367,222
Vol liters	889,560	500,377	222,390	269,092	1,389,937
Avg Temp F	60.65	60.65	60.65	60.65	60.65
Avg Temp K	289.07	289.07	289.07	289.07	289.07
temp corr	0.9449	0.9449	0.9449	0.9449	0.9449
moles	37,526	21,108	9,381	11,352	58,634
VP of VOC(psia)	4.78	4.78	0.59	4.78	4.78
VOC theo fraction	0.33	0.33	0.04	0.33	0.33
Sat Factor	0.60	0.60	0.60	0.60	0.60
moles VOC	7,322	4,119	226	2,215	11,441
mol weight g/g-mole	66.00	66.00	46.07	66.00	66.00
VOC grams/landing	483,271	271,840	10,408	146,189	755,110
VOC lbs/landing	1,065.41	599	23	322	1,665
VOC tons/landing	0.53	0.30	0.01	0.16	0.83
land/yr	3	3	3	3	3
average days per landing	3.0	3.0	3.0	3.0	3.0
VOC lb filling	3,196	1,798	69	967	4,994
VOC lb standing	1,457	820	31	441	2,277
VOC lb/hr when landing	22	12	0	7	34
VOC lb/day when landing	1,551	873	33	469	2,424
Total VOC lbs	4,654	2,618	100	1,408	7,271
Total VOC tons	2.33	1.31	0.05	0.70	3.64

July Vapor Fraction Speciation for Landings

	Gasoline Vapor Wt%
hexane	0.627%
benzene	0.712%
2,2,4 TMP	0.821%
toluene	0.830%
ethylbenzene	0.056%
xylenes	0.243%
cumene	0.0096%
naphthalene	0.000%

Floating Roof (gasoline, transmix,ethanol)
Material: Gasoline
Permitted Material Throughput: **663,630,000** gal/yr (includes 10% for tank-to-tank transfers)

ID	Type	Volume	Throughput (gal/yr)	Tank Height	Diameter
4	IFRT	2,115,695	166,716,103	39	100
5	IFRT	1,245,672	98,158,563	39.4	75
6	IFRT	533,432	42,034,274	39.67	50
7	IFRT	658,805	51,913,628	39.67	55
10	IFRT	3,868,130	304,807,432	43.83	125
	IFRT				
	Total =	**8,421,734**	**663,630,000**		

Fixed Roof
Material: Distillate
Permitted Material Throughput: **220,000,000** gal/yr (includes 10% for tank-to-tank transfers)

ID	Type	Volume	Throughput (gal/yr)	Tank Height	Diameter
1	VFRT	124,000	5,384,158	34	25
2	VFRT	215,936	9,376,077	34	35
3	VFRT	254,366	11,044,732	35	35
9	VFRT	3,627,414	157,504,601	45	125
8	VFRT	845,000	36,690,432	39	60
	Total =	**5,066,716**	**220,000,000**		

Horizontal Tanks
Material:
Permitted Material Throughput: **NA**

ID	Type	Volume	Throughput (gal/yr)	Tank Height	Diameter
11	HT	800	9,600	6.0	4.0
12	HT	10,000	120,000	14.0	10.0
14	HT	8,000	96,000	14.0	10.0
15	HT	1,000	12,000	21.3	8.0
20	HT	300	3,600	21.3	8.0
18	HT	500	6,000	5.0	3.2
19	HT	8,000	96,000	14.0	10.0
	HT				
	Total =	**28,600**	**343,200**		

				Control Device Rating		
Gasoline Throughput - Truck	**603,300,000.0**	gal	**3**	mg/L	0.000025	lb/gal
Distillate Throughput - Truck	**200,000,000.0**	gal	**N/A**	mg/L	N/A	lb/gal

Gasoline fugitives - Truck	**0**	mg/l	-	lb/gal
Distillate emission factor, bottom loading	**1.7**	mg/l	0.000014	lb/gal

Average True Vapor Pressure for Distillate Loading Emission Factor	0.006473891	psia
Average TAA for Distillate Loading Emission Factor	514.01	°R
Saturation Factor	0.6	From AP-42 Section 5.2 Table 5.2-1
Distillate Vapor Molecular Weight	130	lb/lb mol

Gasoline vapor fraction determined per API 19.4.

Distillate vapor fraction determined per API 19.4.

1/ **NOTE:** Loading emission calculations were performed in accordance with guidance in AP-42, Compilation of Air Pollutant Emission

2/ Factors, Fifth Edition, Volume I. Section 5.2

		Truck Loading					
		Gasoline Loading Losses		**Gasoline Loading Fugitives**		**Total Gasoline Loading Losses**	
	Vapor Fraction [1/] - Gasoline	Lbs/Year	Tons/Yr.	Lbs/Year	Tons/Yr.	Lbs/Year	Tons/Yr.
Total VOC	100.00%	**15,103**	**7.551**	-	-	**15,102.717**	**7.551**
hexane	0.43%	**65**	**0.032**	-	-	**64.791**	**0.032**
benzene	0.47%	**71**	**0.036**	-	-	**71.390**	**0.036**
2,2,4 TMP	0.54%	**81**	**0.040**	-	-	**80.811**	**0.040**
toluene	0.52%	**79**	**0.039**	-	-	**78.678**	**0.039**
ethylbenzene	0.03%	**5**	**0.002**	-	-	**4.955**	**0.002**
xylenes	0.14%	**22**	**0.011**	-	-	**21.594**	**0.011**
cumene	0.01%	**1**	**0.000**	-	-	**0.821**	**0.000**
naphthalene	0.00%	**0**	**0.000**	-	-	**0.035**	**0.000**
Total HAP		**323**	**0.162**	-	-	**323.075**	**0.162**
		Distillate Loading Losses				**Total Distillate Loading Losses**	
	Vapor Fraction [2/] - Distillate	Lbs/Year	Tons/Yr.			Lbs/Year	Tons/Yr.
Total VOC	100.00%	2,837	1.419			2,837	1.419
hexane	0.04%	**1**	**0.001**			**1**	**0.001**
benzene	0.21%	**6**	**0.003**			**6**	**0.003**
2,2,4 TMP	0.00%	**-**	**-**			**-**	**-**
toluene	2.37%	**67**	**0.034**			**67**	**0.034**
ethylbenzene	0.30%	**8**	**0.004**			**8**	**0.004**
xylenes	5.77%	**164**	**0.082**			**164**	**0.082**
cumene	0.00%	**-**	**-**			**-**	**-**
naphthalene	0.04%	**1**	**0.001**			**1**	**0.001**
Total HAP		**248**	**1.543**			**248**	**0.124**

	Total Truck Loading Losses
Total VOC	8.97
hexane	0.03
benzene	0.04
2,2,4 TMP	0.04
toluene	0.07
ethylbenzene	0.01
xylenes	0.09
cumene	0.00
naphthalene	0.00
Total HAP	0.29

1/ Gasoline vapor fraction determined per API 19.4.

2/ Distillate vapor fraction determined per API 19.4.

Fugitive Emissions

Fugitive Equipment	Number of units: Light Devices	Heavy Devices	Gas Devices	Emission Factor lb/hour [1/]: Light Devices	Heavy Devices	Gas Devices	Light Devices (lb/yr)	Heavy Devices (lb/yr)	Gas Devices (lb/yr)	Total VOC Emission (lb/yr)
Flanges	302	212	32	0.000017	0.000017	0.00009	44.97384	31.57104	25.2288	101.77368
Other	0	0	0	0.000287	0.000287	0.000265	0	0	0	0
Pumps	3	2	0	0.00117	0.00117	0.000143	30.7476	20.4984	0	51.246
Valves	87	60	9	0.000095	0.000095	0.000029	72.4014	49.932	2.28636	124.61976
						Total	148.12284	102.00144	27.51516	**277.639**

HAP Speciation

HAP	Light Service Liquid Weight Percent[2/]	Heavy Service Liquid Weight Percent[3/]	Vapor Weight Percent[4/] (for gas service)	lb/year	tpy	lb/hr
hexane	1.00	0.00010	0.43	1.599370	0.000799685	0.000182577
benzene	1.80	0.00080	0.47	2.797091	0.001398545	0.000319303
2,2,4 TMP	4.00	0.00000	0.54	6.072140	0.00303607	0.000693167
toluene	7.00	0.03200	0.52	10.544580	0.00527229	0.001203719
ethylbenzene	1.40	0.01300	0.03	2.096007	0.001048004	0.00023927
xylenes	7.00	0.29000	0.14	10.703745	0.005351872	0.001221889
cumene	0.50	0.00000	0.01	0.742110	0.000371055	8.47157E-05
naphthalene	0.42	0.07565	0.00	0.691937	0.000345969	7.89883E-05
			Total	35.246981	0.01762349	tpy

1/ Emissions calculated per EPA guidance "Protocol for Equipment Leak Emission Estimates" (USEPA, November 1995).

2/ Light liquid weight percent based on API 19.4 for gasoline.

3/ Heavy liquid weight percent based on API 19.4 for diesel.

4/ Gasoline vapor weight percent determined per AP-42 Chapter 7

Fuel Combustion Emissions

Existing Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Natural Gas	Weil McLain				3,427

Natural Gas Combustion Emissions (from existing sources)*:

	Combustion Emissions									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG***
Emission Factor**	0.0075	0.0075	0.00059	0.098	0.0054	0.082	0.002	0.00022	116.732	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	25.54	25.54	2.02	336.00	18.48	282.24	7.54	0.75	400,063.91	400,896.31
tons/yr	0.01	0.01	0.00	0.17	0.01	0.14	0.00	0.00	200.03	200.45

*Total emissions from natural gas combustion from existing sources include emissions from the combustion of natural gas in furnaces and boilers and emissions from the combustion of natural gas used as assist gas in the VCUs.

** Emission factors used to estimate emissions for PM, SOx, NOx, VOC and CO are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume 1 Table 1.5-1, in units of lb/MMBTU. CO2 emission factor is from 40 CFR 98 Subpart C Table C-1 for Natural Gas, converted to lb/MMBTU. CH4 and N2O emission factors are from 40 CFR 98 Subpart C Table C-2 for Natural Gas, converted to lb/MMBTU.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Total Natural Gas Used 3,427 MMBTU/yr

Example Calculation (using SOx):

= Total Natural Gas Used * Emission Factor

= Total Natural Gas Used (3,427) MMBTU/yr * 0.00059 lb / MM BTU

$EF_{SOX,crude\ oil}$ = 197.47 lb/ MMSCF

6,360,783 lbs of emissions combusted at VRUTK (gasoline loading)

Total of Combustion Sources

Pollutant	PM 2.5	PM10	SOx	NOx	VOC	CH4	N2O	CO	CO2	GHG
lb/yr	25.54	25.54	2.02	336.00	18.48	282.24	7.54	0.75	400,063.91	400,896.31
tons/yr	0.01	0.01	0.00	0.17	0.01	0.14	0.00	0.00	200.03	200.45

IFRT TANK EMISSION CALCULATION

INPUT DATA

Input data in Green. Select Cells in Red to open the drop down selection list.

	Symbol		Units
Tank No.		4	
Nearest US Location		New York-Kennedy, NY	
Time Period		Annual	
Absolute Pressure 1	P_A	14.68	psi
Product Information			
Product Type (annual average, see below for monthly calcs)		Gasoline - RVP 13	
Vapor Molecular weight	M_v	62	Lb/lb-mole
Vapor Pressure Equation Constant A (Figure 7.1-15)	A	11.64	
Vapor Pressure Equation Constant B (Figure 7.1-15)	B	5043.58	°R
Average organic liquid density	W_L	5.60	lb/gal
Average Reid Vapor Pressure	RVP	13.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Tank design data			
Shell height	Hs	39.00	ft
Diameter	D	100.00	ft
Throughput	Q	166,716,103	gal/yr
Turnovers	N	76.68	per year
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	38.00	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	1.00	ft
Liquid height (assume 1/2 Hs)	H_L	19.50	ft
Tank Construction (pick from drop down list)		Riveted	
Tank Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Internal floating roof design data			
Rim Seal Type:	Vapor-mounted seal	Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)		Average	
Number of fixed roof support columns	Nc	11.00	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columns; 1.0 if	Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	K_D	0.14	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.2	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.0	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	0.0	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.3	NA
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		Bolted	
Select Deck Construction Type		Continuous sheet	
If bolted continuous sheet or panel, enter width		5	
If bolted panel, also enter length			
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft^2

			Loss Factor	
Deck Fitting Data [1/]	**Type**	**Qty**	**Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	1	36.0	
Column Well	Built-up column, ungasketed sliding cover	11	51.0	
Unslotted Guidepole/Well	Gasketed sliding cover w/pole sleeve	0	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve and pol	0	8.3	
Gauge-float well (auto gauge)	Unbolted cover, ungasketed	1	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2	
Deck drain	Stub drain (1-inch diameter)	80	1.2	
Legs (IFR type)	IFR type, Adjustable	32	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7	
Ladder	Sliding cover, ungasketed	1	98.0	
Ladder/guidepole combination	Ladder sleeve, gasketed sliding cover	0	60.0	
Total deck fitting loss factor Eq. 2-14:			1,076.00	per year

[1/] Deck legs determined from AP-42 Table 7.1-15. Stub drains determined from AP-42 7.1-15. All other fitting data taken from assumptions provided in Global IFR roof summary table

ROUTINE EMISSIONS CALCULATIONS

	Symbol		Units
Total Losses (Eq.2-1 & 2-2: LT = LR+LW+LF+LD)	**LT**	**14,445.63**	lb/year
		7.22	ton/year
Data based on specific time averaging period			
True Vapor Pressure Eq. 1-25 PvA = exp(A-(B/TLA))	PvA	6.469	psia
Vapor pressure function; P*=PVA/PA/(1+(1-(PVA/PA))^0.5)^2	P*	0.144	
Daily total solar insolation on a horizontal surface	I	**1231.0**	Btu/ft^2-day
Rim Seal Losses (Eq.2-3: LR = (KRa + KRb v^n)DP* Mv Kc)	**LR**	**1,967.32**	lb/year
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.20	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.00	lb-mole/(mph)nft*yr
Average ambient wind speed at tank site; if IFR use Zero	v	0.00	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.30	NA
Vapor pressure function	P*	0.1442316	NA
Tank diameter	D	100.00	ft
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Withdrawal losses Eq.2-19: L_{WD}=(0.943*Q$C_s$$W_L$/D)*[1+($N_c$$F_c$/D)]	**LW**	**352.47**	lb/yr
Annual throughput	Q	3,969,431	bbl/yr
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft2
Average organic liquid density	W_L	5.60	lb/gal
Tank diameter	D	100.00	ft
Constant	0.943	0.943	1,000 ft3*gal/bbl2
Number of fixed roof support columns	Nc	11.00	NA
Effective column diameter; 1.1, 0.7, or 1.0	Fc	1.10	ft
Deck Fitting Losses (Eq.2-13: LF = FF P*MvKc)	**LF**	**9,621.98**	lb/yr
Total deck fitting loss factor; see Eq. 2-14	FF	1,076.00	lb-mole/year
Vapor pressure function; see Figure 7.1-19	P*	0.14	
Average vapor molecular weight	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Deck Seam Losses (Eq.2-18: LD = KDSDD2P*MvKc)	**LD**	**2,503.86**	lb/yr
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	0.14	lb-mole/ft-yr
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft2
Tank diameter	D	100.00	ft
Vapor pressure function; see Figure 7.1-19	P*	0.14	NA
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Average Daily Ambient Temperature; see Equation 1-30			
TAA = ((TAX+TAN)/2)	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Average Daily Liquid Surface Temperature (TLA) Eq 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	**TLA**	**515.88**	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	°R
Liquid bulk temperature (Equation 1-31)	TB	514.92	°R
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	**TB**	514.92	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	
Tank paint solar absorptance, dimensionless, Table 7.1-6	αs	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	Btu/(ft2 day)

HAPS Speciation

Product - select from list:			Gasoline	
Total HAP Annual Average Emissions			356.97	
Individual HAP Annual Average Emissi Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			59.494	lb/yr
benzene			67.622	lb/yr
TMP			83.146	lb/yr
toluene			91.196	lb/yr
ethylbenzene			9.043	lb/yr
xylenes			42.544	lb/yr
cumene			2.432	lb/yr
naphthalene			1.490	lb/yr
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00397	
benzene	78.11	62	0.00435	
2,2,4 TMP	114.23	62	0.00490	
toluene	92.14	62	0.00472	
ethylbenzene	106.17	62	0.00029	
xylenes	106.17	62	0.00127	
cumene	120.19	62	0.00005	
naphthalene	128.17	62	1.91E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.018482	6.469	0.00286	
benzene	0.022325	6.469	0.00345	
2,2,4 TMP	0.017202	6.469	0.00266	
toluene	0.020546	6.469	0.00318	
ethylbenzene	0.001101	6.469	0.00017	
xylenes	0.004790	6.469	0.00074	
cumene	1.59E-04	6.469	0.00002	
naphthalene	5.97E-06	6.469	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	1.7313
benzene	6.906	1211	220.79	1.0530
2,2,4 TMP	6.812	1257.8	220.74	0.5340
toluene	7.017	1377.6	222.64	0.2940
ethylbenzene	6.95	1419.3	212.61	0.0908
xylenes	7.009	1462.3	215.11	0.0790
cumene	6.929	1455.8	207.2	0.0415
naphthalene	7.146	1831.6	211.82	0.0020

MONTHLY IFRT TANK VOC AND HAP ESTIMATIONS

INPUT DATA		Symbol		Units
Tank No.	**4**			
Nearest US Location			**New York-Kennedy, NY**	
Absolute Pressure		P_A	14.68	psi
Product Information				
Average organic liquid density		W_L	**5.60**	lb/gal
Average Reid Vapor Pressure		RVP	**13.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids		K_c	**1.00**	
Tank design data			**0**	
Shell height		Hs	**39.00**	ft
Diameter		D	**100.00**	ft
Throughput		Q	**13,893,009**	gal/month
Maximum Filling Height (use Hs-1 if unknown)		H_{LX}	**38.00**	ft
Minimum Filling Height (use 1 if unknown)		H_{LN}	**1.00**	ft
Liquid height (assume 1/2 Hs)		H_L	**19.50**	ft
Tank Construction (pick from drop down list)			**Riveted**	
Tank Color (pick from drop down list)			**White**	
Tank Shell Condition (pick from drop down list)			**Average**	
Tank Interior Condition (pick from drop down list)			**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6		α	**0.25**	
Internal floating roof design data				
Rim Seal Type:	**Vapor-mounted seal**		**Rim-mounted secondary**	
Rim Seal Fit (Average or Tight fitting)			**Average**	
Number of fixed roof support columns		Nc	**11.00**	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columms; 1.0 if		Fc	**1.10**	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14		KD	**0.14**	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8		KRa	**2.2**	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8		KRb	**0.0**	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero		v	**0.0**	mph
Seal-related wind speed exponent; see Table 7.1-8		n	**4.3**	NA
Shell clingage factor; see Table 7.1-10		Cs	**0.0015**	bbl/1,000 ft^2
Deck Design Data				
Deck Seam (choose Welded or Bolted)			**Bolted**	
Select Deck Construction Type			**Continuous sheet**	
If bolted continuous sheet or panel, enter width			**5**	
If bolted panel, also enter length			**0**	
Deck seam length factor; Length of Seam / Area of Deck		SD	**0.20**	ft/ft^2
			Loss Factor	
Deck Fitting Data		**Qty**	**Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	**1**	36.0	
Column Well	Built-up column, ungasketed sliding cover	**11**	51.0	
Unslotted Guidepole and Well	Gasketed sliding cover w/pole sleeve	**0**	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve and pole wiper	**0**	8.3	
Gauge-float well (automatic gau	Unbolted cover, ungasketed	**1**	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	**1**	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	**1**	6.2	
Deck drain	Stub drain (1-inch diameter)	**80**	1.2	
Legs (IFR type)	IFR type, Adjustable	**32**	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	**0**	0.7	
Ladder	Sliding cover, ungasketed	**1**	98.0	
Ladder / Guide-Pole Combinati	Ladder sleeve, gasketed sliding cover	**0**	60.0	
	Monthly deck fitting loss factor:	F_F	89.67	per month

MONTH January

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**838.31**	lb/month
		0.42	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	588.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	486.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	493.29	
Average Daily Liquid Surface Temperature Eq. 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**493.75**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	4.948	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.102	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb}\, v^n)DP^*\, M_v\, K_c)/12$ months	L_R	**112.92**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F\, P^*M_vK_c)$	**LF**	**552.29**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**143.72**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		17.948	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		2.7279	lb/month
benzene		3.0865	lb/month
TMP		3.9836	lb/month
toluene		4.6227	lb/month
ethylbenzene		0.5556	lb/month
xylenes		2.6804	lb/month
cumene		0.1689	lb/month
naphthalene		0.1226	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00301
benzene	78.11	60	0.00316
2,2,4 TMP	114.23	60	0.00347
toluene	92.14	60	0.00317
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00077
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.10E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.010392	4.948	0.00210
benzene	0.012047	4.948	0.00243
2,2,4 TMP	0.009046	4.948	0.00183
toluene	0.010248	4.948	0.00207
ethylbenzene	0.000500	4.948	0.00010
xylenes	0.002163	4.948	0.00044
cumene	6.75E-05	4.948	0.00001
naphthalene	2.11E-06	4.948	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	0.9329
benzene	6.906	1211	220.79	0.5446
2,2,4 TMP	6.812	1257.8	220.74	0.2691
toluene	7.017	1377.6	222.64	0.1405
ethylbenzene	6.95	1419.3	212.61	0.0395
xylenes	7.009	1462.3	215.11	0.0342
cumene	6.929	1455.8	207.2	0.0169
naphthalene	7.146	1831.6	211.82	0.0007

MONTH February

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**875.74**	lb/month
		0.44	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	861.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	487.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	494.90	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**495.56**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	5.133	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.107	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb}\, v^n)DP^*\, M_v\, K_c)/12$ months	L_R	**118.15**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F\, P^*M_vK_c)$	**LF**	**577.85**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**150.37**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		18.732	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		2.8832	lb/month
benzene		3.2595	lb/month
TMP		4.1803	lb/month
toluene		4.8148	lb/month
ethylbenzene		0.5677	lb/month
xylenes		2.7330	lb/month
cumene		0.1709	lb/month
naphthalene		0.1227	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00306
benzene	78.11	60	0.00323
2,2,4 TMP	114.23	60	0.00355
toluene	92.14	60	0.00326
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00080
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.63E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.010960	5.133	0.00214
benzene	0.012752	5.133	0.00248
2,2,4 TMP	0.009597	5.133	0.00187
toluene	0.010921	5.133	0.00213
ethylbenzene	0.000538	5.133	0.00010
xylenes	0.002325	5.133	0.00045
cumene	7.30E-05	5.133	0.00001
naphthalene	2.32E-06	5.133	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	0.9839
benzene	6.906	1211	220.79	0.5764
2,2,4 TMP	6.812	1257.8	220.74	0.2855
toluene	7.017	1377.6	222.64	0.1497
ethylbenzene	6.95	1419.3	212.61	0.0425
xylenes	7.009	1462.3	215.11	0.0367
cumene	6.929	1455.8	207.2	0.0183
naphthalene	7.146	1831.6	211.82	0.0007

MONTH March

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**1,046.63**	lb/month
		0.52	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	1175.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	494.30	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	501.98	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**502.89**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	5.935	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.129	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb}\, v^n)DP^*\, M_v\, K_c)/12$ months	L_R	**142.00**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F\, P^*M_vK_c)$	**LF**	**694.53**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**180.73**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		22.480	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		3.6152	lb/month
benzene		4.0810	lb/month
2,2,4 TMP		5.1188	lb/month
toluene		5.7419	lb/month
ethylbenzene		0.6271	lb/month
xylenes		2.9917	lb/month
cumene		0.1808	lb/month
naphthalene		0.1231	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00327
benzene	78.11	60	0.00349
2,2,4 TMP	114.23	60	0.00388
toluene	92.14	60	0.00362
ethylbenzene	106.17	60	0.00021
xylenes	106.17	60	0.00092
cumene	120.19	60	0.00003
naphthalene	128.17	60	1.20E-06

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.013525	5.935	0.00228
benzene	0.015959	5.935	0.00269
2,2,4 TMP	0.012116	5.935	0.00204
toluene	0.014037	5.935	0.00237
ethylbenzene	0.000713	5.935	0.00012
xylenes	0.003092	5.935	0.00052
cumene	9.91E-05	5.935	0.00002
naphthalene	3.35E-06	5.935	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	1.2141
benzene	6.906	1211	220.79	0.7214
2,2,4 TMP	6.812	1257.8	220.74	0.3604
toluene	7.017	1377.6	222.64	0.1925
ethylbenzene	6.95	1419.3	212.61	0.0564
xylenes	7.009	1462.3	215.11	0.0489
cumene	6.929	1455.8	207.2	0.0248
naphthalene	7.146	1831.6	211.82	0.0011

MONTH April

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,356.25**	lb/month
			0.68	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	330,785.92	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	1516.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-		T_{AX}	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	503.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	512.04	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**513.21**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.230	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.168	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**185.22**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**905.91**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**235.74**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			29.845	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	5.0167	lb/month
		benzene	5.6756	lb/month
		2,2,4 TMP	6.9573	lb/month
		toluene	7.5931	lb/month
		ethylbenzene	0.7496	lb/month
		xylenes	3.5269	lb/month
		cumene	0.2017	lb/month
		naphthalene	0.1240	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00356	
benzene	78.11	60	0.00388	
2,2,4 TMP	114.23	60	0.00436	
toluene	92.14	60	0.00417	
ethylbenzene	106.17	60	0.00026	
xylenes	106.17	60	0.00111	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.62E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.017962	7.230	0.00248	
benzene	0.021597	7.230	0.00299	
2,2,4 TMP	0.016591	7.230	0.00229	
toluene	0.019696	7.230	0.00272	
ethylbenzene	0.001045	7.230	0.00014	
xylenes	0.004541	7.230	0.00063	
cumene	1.49E-04	7.230	0.00002	
naphthalene	5.50E-06	7.230	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	1.6125
benzene	6.906	1211	220.79	0.9762
2,2,4 TMP	6.812	1257.8	220.74	0.4935
toluene	7.017	1377.6	222.64	0.2701
ethylbenzene	6.95	1419.3	212.61	0.0825
xylenes	7.009	1462.3	215.11	0.0717
cumene	6.929	1455.8	207.2	0.0374
naphthalene	7.146	1831.6	211.82	0.0018

MONTH May

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**933.24**	lb/month
			0.47	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	330,785.92	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1760.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**520.10**	°R
Average daily maximum ambient temperature, Table		T_{AX}	527.50	°R
Average daily minimum ambient temperature, Table		T_{AN}	512.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	521.42	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**522.78**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.901	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.101	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**126.17**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**617.11**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**160.59**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			32.795	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	5.4662	lb/month
		benzene	6.2588	lb/month
		2,2,4 TMP	7.6801	lb/month
		toluene	8.4214	lb/month
		ethylbenzene	0.8148	lb/month
		xylenes	3.8153	lb/month
		cumene	0.2139	lb/month
		naphthalene	0.1247	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00572	
benzene	78.11	68	0.00634	
2,2,4 TMP	114.23	68	0.00720	
toluene	92.14	68	0.00704	
ethylbenzene	106.17	68	0.00045	
xylenes	106.17	68	0.00195	
cumene	120.19	68	0.00007	
naphthalene	128.17	68	3.14E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.022129	4.901	0.00452	
benzene	0.027047	4.901	0.00552	
2,2,4 TMP	0.020997	4.901	0.00428	
toluene	0.025471	4.901	0.00520	
ethylbenzene	0.001402	4.901	0.00029	
xylenes	0.006109	4.901	0.00125	
cumene	2.06E-04	4.901	0.00004	
naphthalene	8.16E-06	4.901	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	2.0729
benzene	6.906	1211	220.79	1.2758
2,2,4 TMP	6.812	1257.8	220.74	0.6518
toluene	7.017	1377.6	222.64	0.3644
ethylbenzene	6.95	1419.3	212.61	0.1155
xylenes	7.009	1462.3	215.11	0.1007
cumene	6.929	1455.8	207.2	0.0537
naphthalene	7.146	1831.6	211.82	0.0027

MONTH June

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,177.42**	lb/month
			0.59	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	330,785.92	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1898.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	522.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.27	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**532.74**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.927	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.129	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**160.26**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**783.82**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**203.97**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			42.917	lb/month
Individual HAP Monthly Emissio	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	7.2684	lb/month
		benzene	8.3811	lb/month
		TMP	10.1827	lb/month
		toluene	11.0628	lb/month
		ethylbenzene	1.0033	lb/month
		xylenes	4.6441	lb/month
		cumene	0.2477	lb/month
		naphthalene	0.1265	lb/month
Vapor Weight Concentrations Ec $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00608	
benzene	78.11	68	0.00684	
2,2,4 TMP	114.23	68	0.00785	
toluene	92.14	68	0.00785	
ethylbenzene	106.17	68	0.00052	
xylenes	106.17	68	0.00225	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.01E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.028411	5.927	0.00479	
benzene	0.035291	5.927	0.00595	
2,2,4 TMP	0.027683	5.927	0.00467	
toluene	0.034315	5.927	0.00579	
ethylbenzene	0.001958	5.927	0.00033	
xylenes	0.008557	5.927	0.00144	
cumene	2.95E-04	5.927	0.00005	
naphthalene	1.26E-05	5.927	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	2.6614
benzene	6.906	1211	220.79	1.6646
2,2,4 TMP	6.812	1257.8	220.74	0.8593
toluene	7.017	1377.6	222.64	0.4910
ethylbenzene	6.95	1419.3	212.61	0.1614
xylenes	7.009	1462.3	215.11	0.1411
cumene	6.929	1455.8	207.2	0.0770
naphthalene	7.146	1831.6	211.82	0.0042

MONTH July

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**1,341.13**	lb/month
			0.67	tons/month
Product Type			**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known)		Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		**I**	1867.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**535.35**	°R
Average daily maximum ambient temperature, Ta		T_{AX}	542.10	°R
Average daily minimum ambient temperature, Tab		T_{AN}	528.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	536.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**538.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.557	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**183.11**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**895.59**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**233.05**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			50.053	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	8.5142	lb/month
		benzene	9.8624	lb/month
		2,2,4 TMP	11.9410	lb/month
		toluene	12.9449	lb/month
		ethylbenzene	1.1406	lb/month
		xylenes	5.2492	lb/month
		cumene	0.2728	lb/month
		naphthalene	0.1279	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	68	0.00627	
benzene	78.11	68	0.00712	
2,2,4 TMP	114.23	68	0.00821	
toluene	92.14	68	0.00830	
ethylbenzene	106.17	68	0.00056	
xylenes	106.17	68	0.00243	
cumene	120.19	68	0.00010	
naphthalene	128.17	68	4.55E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.032424	6.557	0.00494	
benzene	0.040618	6.557	0.00619	
2,2,4 TMP	0.032037	6.557	0.00489	
toluene	0.040170	6.557	0.00613	
ethylbenzene	0.002335	6.557	0.00036	
xylenes	0.010223	6.557	0.00156	
cumene	3.56E-04	6.557	0.00005	
naphthalene	1.58E-05	6.557	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	3.0372
benzene	6.906	1211	220.79	1.9159
2,2,4 TMP	6.812	1257.8	220.74	0.9944
toluene	7.017	1377.6	222.64	0.5747
ethylbenzene	6.95	1419.3	212.61	0.1925
xylenes	7.009	1462.3	215.11	0.1685
cumene	6.929	1455.8	207.2	0.0930
naphthalene	7.146	1831.6	211.82	0.0053

MONTH August

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**1,305.64**	lb/month
			0.65	tons/month
Product Type			**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known		Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		**I**	1661.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**534.55**	°R
Average daily maximum ambient tempera		T_{AX}	541.10	°R
Average daily minimum ambient tempera		T_{AN}	528.00	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	535.80	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**537.08**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.424	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.143	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ month		L_R	**178.16**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**871.36**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**226.75**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			48.485	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	8.2419	lb/month
		benzene	9.5379	lb/month
		2,2,4 TMP	11.5551	lb/month
		toluene	12.5303	lb/month
		ethylbenzene	1.1102	lb/month
		xylenes	5.1151	lb/month
		cumene	0.2672	lb/month
		naphthalene	0.1276	lb/month
Vapor Weight Concentrations Eq. 40- $Z_{Vi} = y_iM_i / M_V$				
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	68	0.00623	
benzene	78.11	68	0.00706	
2,2,4 TMP	114.23	68	0.00813	
toluene	92.14	68	0.00821	
ethylbenzene	106.17	68	0.00055	
xylenes	106.17	68	0.00240	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.44E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.031568	6.424	0.00491	
benzene	0.039479	6.424	0.00615	
2,2,4 TMP	0.031104	6.424	0.00484	
toluene	0.038910	6.424	0.00606	
ethylbenzene	0.002253	6.424	0.00035	
xylenes	0.009862	6.424	0.00154	
cumene	3.43E-04	6.424	0.00005	
naphthalene	1.51E-05	6.424	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	2.9571
benzene	6.906	1211	220.79	1.8621
2,2,4 TMP	6.812	1257.8	220.74	0.9655
toluene	7.017	1377.6	222.64	0.5567
ethylbenzene	6.95	1419.3	212.61	0.1857
xylenes	7.009	1462.3	215.11	0.1626
cumene	6.929	1455.8	207.2	0.0895
naphthalene	7.146	1831.6	211.82	0.0051

MONTH September

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**2,151.86**	lb/month
			1.08	tons/month
Product Type			**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)		Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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**	1328.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	521.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.95	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**529.98**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	9.802	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.269	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**296.29**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**1,449.11**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**377.09**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			50.920	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	8.8836	lb/month
		benzene	10.1571	lb/month
		2,2,4 TMP	12.1887	lb/month
		toluene	13.0035	lb/month
		ethylbenzene	1.1238	lb/month
		xylenes	5.1686	lb/month
		cumene	0.2674	lb/month
		naphthalene	0.1273	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00405	
benzene	78.11	60	0.00454	
2,2,4 TMP	114.23	60	0.00519	
toluene	92.14	60	0.00516	
ethylbenzene	106.17	60	0.00034	
xylenes	106.17	60	0.00147	
cumene	120.19	60	0.00006	
naphthalene	128.17	60	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	0.027688	9.802	0.00282	
benzene	0.034242	9.802	0.00349	
2,2,4 TMP	0.026783	9.802	0.00273	
toluene	0.033004	9.802	0.00337	
ethylbenzene	0.001865	9.802	0.00019	
xylenes	0.008143	9.802	0.00083	
cumene	2.79E-04	9.802	0.00003	
naphthalene	1.17E-05	9.802	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	2.4855
benzene	6.906	1211	220.79	1.5478
2,2,4 TMP	6.812	1257.8	220.74	0.7967
toluene	7.017	1377.6	222.64	0.4525
ethylbenzene	6.95	1419.3	212.61	0.1473
xylenes	7.009	1462.3	215.11	0.1287
cumene	6.929	1455.8	207.2	0.0698
naphthalene	7.146	1831.6	211.82	0.0038

MONTH October

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,542.29**	lb/month
			0.77	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	969.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	509.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	517.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**518.13**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.921	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.192	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months		L_R	**211.19**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c$		LF	**1,032.93**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c$/12 months		LD	**268.79**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			34.546	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	5.8937	lb/month
		benzene	6.6837	lb/month
		2,2,4 TMP	8.1274	lb/month
		toluene	8.7887	lb/month
		ethylbenzene	0.8306	lb/month
		xylenes	3.8818	lb/month
		cumene	0.2157	lb/month
		naphthalene	0.1247	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00370	
benzene	78.11	60	0.00407	
2,2,4 TMP	114.23	60	0.00460	
toluene	92.14	60	0.00445	
ethylbenzene	106.17	60	0.00028	
xylenes	106.17	60	0.00121	
cumene	120.19	60	0.00005	
naphthalene	128.17	60	1.86E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.020464	7.921	0.00258	
benzene	0.024816	7.921	0.00313	
2,2,4 TMP	0.019168	7.921	0.00242	
toluene	0.023012	7.921	0.00291	
ethylbenzene	0.001244	7.921	0.00016	
xylenes	0.005416	7.921	0.00068	
cumene	1.80E-04	7.921	0.00002	
naphthalene	6.90E-06	7.921	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	1.8371
benzene	6.906	1211	220.79	1.1217
2,2,4 TMP	6.812	1257.8	220.74	0.5702
toluene	7.017	1377.6	222.64	0.3155
ethylbenzene	6.95	1419.3	212.61	0.0983
xylenes	7.009	1462.3	215.11	0.0856
cumene	6.929	1455.8	207.2	0.0452
naphthalene	7.146	1831.6	211.82	0.0022

MONTH November

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,188.43**	lb/month
			0.59	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	630.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	500.90	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	507.52	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**508.01**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.552	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months		L_R	**161.80**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c$		LF	**791.34**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c$/12 months		LD	**205.92**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			25.772	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	4.2467	lb/month
		benzene	4.7965	lb/month
		2,2,4 TMP	5.9414	lb/month
		toluene	6.5654	lb/month
		ethylbenzene	0.6810	lb/month
		xylenes	3.2273	lb/month
		cumene	0.1899	lb/month
		naphthalene	0.1235	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00341	
benzene	78.11	60	0.00368	
2,2,4 TMP	114.23	60	0.00411	
toluene	92.14	60	0.00389	
ethylbenzene	106.17	60	0.00023	
xylenes	106.17	60	0.00101	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.40E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.015596	6.552	0.00238	
benzene	0.018578	6.552	0.00284	
2,2,4 TMP	0.014188	6.552	0.00217	
toluene	0.016640	6.552	0.00254	
ethylbenzene	0.000864	6.552	0.00013	
xylenes	0.003751	6.552	0.00057	
cumene	1.22E-04	6.552	0.00002	
naphthalene	4.30E-06	6.552	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	1.4001
benzene	6.906	1211	220.79	0.8398
2,2,4 TMP	6.812	1257.8	220.74	0.4221
toluene	7.017	1377.6	222.64	0.2282
ethylbenzene	6.95	1419.3	212.61	0.0683
xylenes	7.009	1462.3	215.11	0.0593
cumene	6.929	1455.8	207.2	0.0305
naphthalene	7.146	1831.6	211.82	0.0014

MONTH December

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**935.24**	lb/month
			0.47	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	**330,785.92**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	513.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	491.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	497.88	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**498.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.419	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.115	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months		L_R	**126.45**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**29.37**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c$		LF	**618.47**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c$/12 months		LD	**160.94**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			20.007	lb/month
Individual HAP Monthly Emi	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	3.1340	lb/month
		benzene	3.5398	lb/month
		TMP	4.4997	lb/month
		toluene	5.1287	lb/month
		ethylbenzene	0.5876	lb/month
		xylenes	2.8197	lb/month
		cumene	0.1742	lb/month
		naphthalene	0.1228	lb/month
Vapor Weight Concentration	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00314	
benzene	78.11	60	0.00332	
2,2,4 TMP	114.23	60	0.00367	
toluene	92.14	60	0.00339	
ethylbenzene	106.17	60	0.00019	
xylenes	106.17	60	0.00084	
cumene	120.19	60	0.00003	
naphthalene	128.17	60	1.05E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.011860	5.419	0.00219	
benzene	0.013872	5.419	0.00256	
2,2,4 TMP	0.010474	5.419	0.00193	
toluene	0.012000	5.419	0.00221	
ethylbenzene	0.000598	5.419	0.00011	
xylenes	0.002588	5.419	0.00048	
cumene	8.19E-05	5.419	0.00002	
naphthalene	2.66E-06	5.419	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	1.0647
benzene	6.906	1211	220.79	0.6271
2,2,4 TMP	6.812	1257.8	220.74	0.3116
toluene	7.017	1377.6	222.64	0.1645
ethylbenzene	6.95	1419.3	212.61	0.0472
xylenes	7.009	1462.3	215.11	0.0409
cumene	6.929	1455.8	207.2	0.0205
naphthalene	7.146	1831.6	211.82	0.0009

IFRT TANK EMISSION CALCULATION

INPUT DATA

Input data in Green. Select Cells in Red to open the drop down selection list.

	Symbol		Units
Tank No.		5	
Nearest US Location		New York-Kennedy, NY	
Time Period		Annual	
Absolute Pressure	P_A	14.68	psi
Product Information			
Product Type (annual average, see below for monthly calcs)		Gasoline - RVP 13	
Vapor Molecular weight	M_v	62	Lb/lb-mole
Vapor Pressure Equation Constant A (Figure 7.1-15)	A	11.64	
Vapor Pressure Equation Constant B (Figure 7.1-15)	B	5043.58	°R
Average organic liquid density	W_L	5.60	lb/gal
Average Reid Vapor Pressure	RVP	13.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Tank design data			
Shell height	Hs	39.40	ft
Diameter	D	75.00	ft
Throughput	Q	98,158,563	gal/yr
Turnovers	N	79.41	per year
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	38.40	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	1.00	ft
Liquid height (assume 1/2 Hs)	H_L	19.70	ft
Tank Construction (pick from drop down list)		Riveted	
Tank Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Internal floating roof design data			
Rim Seal Type:	Vapor-mounted seal	Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)		Average	
Number of fixed roof support columns	Nc	10.00	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columns; 1.0 if	Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	K_D	0.14	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.2	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.0	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	0.0	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.3	NA
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		Bolted	
Select Deck Construction Type		Continuous sheet	
If bolted continuous sheet or panel, enter width		5	
If bolted panel, also enter length			
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft^2

Deck Fitting Data	**Type**	**Qty**	**Loss Factor Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	1	36.0	
Column Well	Built-up column, ungasketed sliding cover	10	51.0	
Unslotted Guidepole/Well	Gasketed sliding cover w/pole sleeve	0	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	0	11.0	
Gauge-float well (auto gauge)	Unbolted cover, ungasketed	1	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2	
Deck drain	Stub drain (1-inch diameter)	45	1.2	
Legs (IFR type)	IFR type, Adjustable	22	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7	
Ladder	Sliding cover, ungasketed	1	98.0	
Ladder/guidepole combination	Ladder sleeve, gasketed sliding cover	0	60.0	
Total deck fitting loss factor Eq. 2-14:			904.00	per year

ROUTINE EMISSIONS CALCULATIONS

	Symbol		Units
Total Losses (Eq.2-1 & 2-2: LT = LR+LW+LF+LD)	**LT**	**11,250.84**	lb/year
		5.63	ton/year
Data based on specific time averaging period			
True Vapor Pressure Eq. 1-25 PvA = exp(A-(B/TLA))	PvA	6.469	psia
Vapor pressure function; P*=PVA/PA/(1+(1-(PVA/PA))^0.5)^2	P*	0.144	
Daily total solar insolation on a horizontal surface	I	**1231.0**	Btu/ft^2-day
Rim Seal Losses (Eq.2-3: LR = (KRa + KRb v^n)DP* Mv Kc)	**LR**	**1,475.49**	lb/year
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.20	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.00	lb-mole/(mph)nft*yr
Average ambient wind speed at tank site; if IFR use Zero	v	0.00	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.30	NA
Vapor pressure function	P*	0.1442316	NA
Tank diameter	D	75.00	ft
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Withdrawal losses Eq.2-19: L_{WD}=(0.943*QC$_s$W$_L$/D)*[1+(N$_c$F$_c$/D)]	**LW**	**283.04**	lb/yr
Annual throughput	Q	2,337,109	bbl/yr
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft2
Average organic liquid density	W_L	5.60	lb/gal
Tank diameter	D	75.00	ft
Constant	0.943	0.943	1,000 ft3*gal/bbl2
Number of fixed roof support columns	Nc	10.00	NA
Effective column diameter; 1.1, 0.7, or 1.0	Fc	1.10	ft
Deck Fitting Losses (Eq.2-13: LF = FF P*MvKc)	**LF**	**8,083.89**	lb/yr
Total deck fitting loss factor; see Eq. 2-14	FF	904.00	lb-mole/year
Vapor pressure function; see Figure 7.1-19	P*	0.14	
Average vapor molecular weight	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Deck Seam Losses (Eq.2-18: LD = KDSDD2P*MvKc)	**LD**	**1,408.42**	lb/yr
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	0.14	lb-mole/ft-yr
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft2
Tank diameter	D	75.00	ft
Vapor pressure function; see Figure 7.1-19	P*	0.14	NA
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Average Daily Ambient Temperature; see Equation 1-30			
TAA = ((TAX+TAN)/2)	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Average Daily Liquid Surface Temperature (TLA) Eq 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	**TLA**	**515.88**	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	°R
Liquid bulk temperature (Equation 1-31)	TB	514.92	°R
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	**TB**	514.92	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	
Tank paint solar absorptance, dimensionless, Table 7.1-6	αs	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	Btu/(ft2 day)

HAPS Speciation

	Product - select from list:		**Gasoline**	
Total HAP Annual Average Emissions			279.82	
Individual HAP Annual Average Emissi Eq. 40-2 L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + $Z_{Li}$$L_W$				
			L_{Ti}	
hexane			46.388	lb/yr
benzene			52.783	lb/yr
TMP			65.057	lb/yr
toluene			71.583	lb/yr
ethylbenzene			7.160	lb/yr
xylenes			33.721	lb/yr
cumene			1.937	lb/yr
naphthalene			1.196	lb/yr
Vapor Weight Concentrations Eq. 40-6 Z_{Vi} = $y_i$$M_i$ / M_V				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00397	
benzene	78.11	62	0.00435	
2,2,4 TMP	114.23	62	0.00490	
toluene	92.14	62	0.00472	
ethylbenzene	106.17	62	0.00029	
xylenes	106.17	62	0.00127	
cumene	120.19	62	0.00005	
naphthalene	128.17	62	1.91E-06	
Vapor Mole Fraction Eq. 40-5 y_i = P_i / P_{VA}				
	P_i = P_{VA}(x_i)	P_{VA}	y_i	
hexane	0.018482	6.469	0.00286	
benzene	0.022325	6.469	0.00345	
2,2,4 TMP	0.017202	6.469	0.00266	
toluene	0.020546	6.469	0.00318	
ethylbenzene	0.001101	6.469	0.00017	
xylenes	0.004790	6.469	0.00074	
cumene	1.59E-04	6.469	0.00002	
naphthalene	5.97E-06	6.469	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	1.7313
benzene	6.906	1211	220.79	1.0530
2,2,4 TMP	6.812	1257.8	220.74	0.5340
toluene	7.017	1377.6	222.64	0.2940
ethylbenzene	6.95	1419.3	212.61	0.0908
xylenes	7.009	1462.3	215.11	0.0790
cumene	6.929	1455.8	207.2	0.0415
naphthalene	7.146	1831.6	211.82	0.0020

MONTHLY IFRT TANK VOC AND HAP ESTIMATIONS

INPUT DATA	Symbol		Units
Tank No. 5			
Nearest US Location		**New York-Kennedy, NY**	
Absolute Pressure	P_A	14.68	psi
Product Information			
Average organic liquid density	W_L	**5.60**	lb/gal
Average Reid Vapor Pressure	RVP	**13.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	K_c	**1.00**	
Tank design data		**0**	
Shell height	Hs	**39.40**	ft
Diameter	D	**75.00**	ft
Throughput	Q	**8,179,880**	gal/month
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	**38.40**	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	**1.00**	ft
Liquid height (assume 1/2 Hs)	H_L	**19.70**	ft
Tank Construction (pick from drop down list)		**Riveted**	
Tank Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Internal floating roof design data			
Rim Seal Type:	**Vapor-mounted seal**	**Rim-mounted secondary**	
Rim Seal Fit (Average or Tight fitting)		**Average**	
Number of fixed roof support columns	Nc	**10.00**	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columms; 1.0 if	Fc	**1.10**	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	**0.14**	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	KRa	**2.2**	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	KRb	**0.0**	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	**0.0**	mph
Seal-related wind speed exponent; see Table 7.1-8	n	**4.3**	NA
Shell clingage factor; see Table 7.1-10	Cs	**0.0015**	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		**Bolted**	
Select Deck Construction Type		**Continuous sheet**	
If bolted continuous sheet or panel, enter width		**5**	
If bolted panel, also enter length		**0**	
Deck seam length factor; Length of Seam / Area of Deck	SD	**0.20**	ft/ft^2
		Loss Factor	
Deck Fitting Data	**Qty**	**Kf (Table 7.1-12)**	
Access Hatch — Unbolted cover, ungasketed	**1**	36.0	
Column Well — Built-up column, ungasketed sliding cover	**10**	51.0	
Unslotted Guidepole and Well — Gasketed sliding cover w/pole sleeve	**0**	8.6	
Slotted guidepole/sample well — Gasketed sliding cover, with pole sleeve	**0**	11.0	
Gauge-float well (automatic gau — Unbolted cover, ungasketed	**1**	14.0	
Gauge-hatch/sample port — Slit fabric seal, 10% open area	**1**	12.0	
Vacuum Breaker — Weighted mechanical actuation, gasketed	**1**	6.2	
Deck drain — Stub drain (1-inch diameter)	**45**	1.2	
Legs (IFR type) — IFR type, Adjustable	**22**	7.9	
Rim Vent — Weighted mechanical actuation, gasketed	**0**	0.7	
Ladder — Sliding cover, ungasketed	**1**	98.0	
Ladder / Guide-Pole Combinati — Ladder sleeve, gasketed sliding cover	**0**	60.0	
Monthly deck fitting loss factor:	F_F	75.33	per month

MONTH January

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**653.13**	lb/month
		0.33	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	194,759.05	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	588.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	486.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	493.29	
Average Daily Liquid Surface Temperature Eq. 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**493.75**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	4.948	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.102	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**84.69**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**464.01**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**80.84**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		14.136	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		2.1302	lb/month
benzene		2.4151	lb/month
TMP		3.1293	lb/month
toluene		3.6485	lb/month
ethylbenzene		0.4426	lb/month
xylenes		2.1369	lb/month
cumene		0.1351	lb/month
naphthalene		0.0985	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00301
benzene	78.11	60	0.00316
2,2,4 TMP	114.23	60	0.00347
toluene	92.14	60	0.00317
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00077
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.10E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010392	4.948	0.00210
benzene	0.012047	4.948	0.00243
2,2,4 TMP	0.009046	4.948	0.00183
toluene	0.010248	4.948	0.00207
ethylbenzene	0.000500	4.948	0.00010
xylenes	0.002163	4.948	0.00044
cumene	6.75E-05	4.948	0.00001
naphthalene	2.11E-06	4.948	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	0.9329
benzene	6.906	1211	220.79	0.5446
2,2,4 TMP	6.812	1257.8	220.74	0.2691
toluene	7.017	1377.6	222.64	0.1405
ethylbenzene	6.95	1419.3	212.61	0.0395
xylenes	7.009	1462.3	215.11	0.0342
cumene	6.929	1455.8	207.2	0.0169
naphthalene	7.146	1831.6	211.82	0.0007

MONTH February

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**682.26**	lb/month
		0.34	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	194,759.05	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	861.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	487.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	494.90	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**495.56**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	5.133	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.107	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**88.61**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**485.48**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**84.58**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		14.746	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		2.2511	lb/month
benzene		2.5497	lb/month
TMP		3.2823	lb/month
toluene		3.7980	lb/month
ethylbenzene		0.4520	lb/month
xylenes		2.1778	lb/month
cumene		0.1367	lb/month
naphthalene		0.0985	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00306
benzene	78.11	60	0.00323
2,2,4 TMP	114.23	60	0.00355
toluene	92.14	60	0.00326
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00080
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.63E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010960	5.133	0.00214
benzene	0.012752	5.133	0.00248
2,2,4 TMP	0.009597	5.133	0.00187
toluene	0.010921	5.133	0.00213
ethylbenzene	0.000538	5.133	0.00010
xylenes	0.002325	5.133	0.00045
cumene	7.30E-05	5.133	0.00001
naphthalene	2.32E-06	5.133	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	0.9839
benzene	6.906	1211	220.79	0.5764
2,2,4 TMP	6.812	1257.8	220.74	0.2855
toluene	7.017	1377.6	222.64	0.1497
ethylbenzene	6.95	1419.3	212.61	0.0425
xylenes	7.009	1462.3	215.11	0.0367
cumene	6.929	1455.8	207.2	0.0183
naphthalene	7.146	1831.6	211.82	0.0007

MONTH March

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**815.25**	lb/month
		0.41	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	194,759.05	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	1175.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	494.30	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	501.98	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**502.89**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	5.935	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.129	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**106.50**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**583.50**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**101.66**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		17.663	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		2.8208	lb/month
benzene		3.1891	lb/month
2,2,4 TMP		4.0128	lb/month
toluene		4.5195	lb/month
ethylbenzene		0.4982	lb/month
xylenes		2.3792	lb/month
cumene		0.1443	lb/month
naphthalene		0.0988	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00327
benzene	78.11	60	0.00349
2,2,4 TMP	114.23	60	0.00388
toluene	92.14	60	0.00362
ethylbenzene	106.17	60	0.00021
xylenes	106.17	60	0.00092
cumene	120.19	60	0.00003
naphthalene	128.17	60	1.20E-06

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.013525	5.935	0.00228
benzene	0.015959	5.935	0.00269
2,2,4 TMP	0.012116	5.935	0.00204
toluene	0.014037	5.935	0.00237
ethylbenzene	0.000713	5.935	0.00012
xylenes	0.003092	5.935	0.00052
cumene	9.91E-05	5.935	0.00002
naphthalene	3.35E-06	5.935	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	1.2141
benzene	6.906	1211	220.79	0.7214
2,2,4 TMP	6.812	1257.8	220.74	0.3604
toluene	7.017	1377.6	222.64	0.1925
ethylbenzene	6.95	1419.3	212.61	0.0564
xylenes	7.009	1462.3	215.11	0.0489
cumene	6.929	1455.8	207.2	0.0248
naphthalene	7.146	1831.6	211.82	0.0011

MONTH April

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**1,056.21**	lb/month
			0.53	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	194,759.05	barrels/month
Vapor Molecular weight		M_v	**60.15**	
Vapor Pressure Equation Constant A		A	11.60	
Vapor Pressure Equation Constant B		B	4937.93	^oR
Daily total solar insolation on a horizontal surface		**I**	1516.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**510.90**	^oR
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	518.20	^oR
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	503.60	^oR
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	512.04	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**513.21**	^oR
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.230	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.168	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**138.92**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**761.10**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**132.60**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			23.395	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	3.9115	lb/month
		benzene	4.4301	lb/month
		2,2,4 TMP	5.4435	lb/month
		toluene	5.9602	lb/month
		ethylbenzene	0.5935	lb/month
		xylenes	2.7957	lb/month
		cumene	0.1606	lb/month
		naphthalene	0.0996	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00356	
benzene	78.11	60	0.00388	
2,2,4 TMP	114.23	60	0.00436	
toluene	92.14	60	0.00417	
ethylbenzene	106.17	60	0.00026	
xylenes	106.17	60	0.00111	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.62E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.017962	7.230	0.00248	
benzene	0.021597	7.230	0.00299	
2,2,4 TMP	0.016591	7.230	0.00229	
toluene	0.019696	7.230	0.00272	
ethylbenzene	0.001045	7.230	0.00014	
xylenes	0.004541	7.230	0.00063	
cumene	1.49E-04	7.230	0.00002	
naphthalene	5.50E-06	7.230	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	1.6125
benzene	6.906	1211	220.79	0.9762
2,2,4 TMP	6.812	1257.8	220.74	0.4935
toluene	7.017	1377.6	222.64	0.2701
ethylbenzene	6.95	1419.3	212.61	0.0825
xylenes	7.009	1462.3	215.11	0.0717
cumene	6.929	1455.8	207.2	0.0374
naphthalene	7.146	1831.6	211.82	0.0018

MONTH May

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**727.01**	lb/month
			0.36	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	194,759.05	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	^oR
Daily total solar insolation on a horizontal surface		**I**	1760.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**520.10**	^oR
Average daily maximum ambient temperature, Table		T_{AX}	527.50	^oR
Average daily minimum ambient temperature, Table		T_{AN}	512.70	^oR
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	521.42	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**522.78**	^oR
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.901	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.101	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**94.63**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**518.46**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**90.33**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			25.691	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	4.2613	lb/month
		benzene	4.8839	lb/month
		2,2,4 TMP	6.0060	lb/month
		toluene	6.6048	lb/month
		ethylbenzene	0.6443	lb/month
		xylenes	3.0201	lb/month
		cumene	0.1701	lb/month
		naphthalene	0.1001	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00572	
benzene	78.11	68	0.00634	
2,2,4 TMP	114.23	68	0.00720	
toluene	92.14	68	0.00704	
ethylbenzene	106.17	68	0.00045	
xylenes	106.17	68	0.00195	
cumene	120.19	68	0.00007	
naphthalene	128.17	68	3.14E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.022129	4.901	0.00452	
benzene	0.027047	4.901	0.00552	
2,2,4 TMP	0.020997	4.901	0.00428	
toluene	0.025471	4.901	0.00520	
ethylbenzene	0.001402	4.901	0.00029	
xylenes	0.006109	4.901	0.00125	
cumene	2.06E-04	4.901	0.00004	
naphthalene	8.16E-06	4.901	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	2.0729
benzene	6.906	1211	220.79	1.2758
2,2,4 TMP	6.812	1257.8	220.74	0.6518
toluene	7.017	1377.6	222.64	0.3644
ethylbenzene	6.95	1419.3	212.61	0.1155
xylenes	7.009	1462.3	215.11	0.1007
cumene	6.929	1455.8	207.2	0.0537
naphthalene	7.146	1831.6	211.82	0.0027

MONTH June

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**917.04**	lb/month
			0.46	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	194,759.05	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	^oR
Daily total solar insolation on a horizontal surface		**I**	1898.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**529.85**	^oR
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	536.90	^oR
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	522.80	^oR
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.27	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**532.74**	^oR
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.927	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.129	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**120.20**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**658.53**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**114.73**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			33.567	lb/month
Individual HAP Monthly Emissio	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	5.6638	lb/month
		benzene	6.5356	lb/month
		TMP	7.9537	lb/month
		toluene	8.6604	lb/month
		ethylbenzene	0.7910	lb/month
		xylenes	3.6651	lb/month
		cumene	0.1964	lb/month
		naphthalene	0.1015	lb/month
Vapor Weight Concentrations Ec $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00608	
benzene	78.11	68	0.00684	
2,2,4 TMP	114.23	68	0.00785	
toluene	92.14	68	0.00785	
ethylbenzene	106.17	68	0.00052	
xylenes	106.17	68	0.00225	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.01E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.028411	5.927	0.00479	
benzene	0.035291	5.927	0.00595	
2,2,4 TMP	0.027683	5.927	0.00467	
toluene	0.034315	5.927	0.00579	
ethylbenzene	0.001958	5.927	0.00033	
xylenes	0.008557	5.927	0.00144	
cumene	2.95E-04	5.927	0.00005	
naphthalene	1.26E-05	5.927	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	2.6614
benzene	6.906	1211	220.79	1.6646
2,2,4 TMP	6.812	1257.8	220.74	0.8593
toluene	7.017	1377.6	222.64	0.4910
ethylbenzene	6.95	1419.3	212.61	0.1614
xylenes	7.009	1462.3	215.11	0.1411
cumene	6.929	1455.8	207.2	0.0770
naphthalene	7.146	1831.6	211.82	0.0042

MONTH July

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**1,044.45**	lb/month
			0.52	tons/month
Product Type			**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known)		Q_{month}	**194,759.05**	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		**I**	1867.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**535.35**	°R
Average daily maximum ambient temperature, Ta		T_{AX}	542.10	°R
Average daily minimum ambient temperature, Tab		T_{AN}	528.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	536.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**538.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.557	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**137.34**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**752.43**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**131.09**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			39.121	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	6.6333	lb/month
		benzene	7.6884	lb/month
		2,2,4 TMP	9.3220	lb/month
		toluene	10.1252	lb/month
		ethylbenzene	0.8978	lb/month
		xylenes	4.1361	lb/month
		cumene	0.2159	lb/month
		naphthalene	0.1025	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00627	
benzene	78.11	68	0.00712	
2,2,4 TMP	114.23	68	0.00821	
toluene	92.14	68	0.00830	
ethylbenzene	106.17	68	0.00056	
xylenes	106.17	68	0.00243	
cumene	120.19	68	0.00010	
naphthalene	128.17	68	4.55E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.032424	6.557	0.00494	
benzene	0.040618	6.557	0.00619	
2,2,4 TMP	0.032037	6.557	0.00489	
toluene	0.040170	6.557	0.00613	
ethylbenzene	0.002335	6.557	0.00036	
xylenes	0.010223	6.557	0.00156	
cumene	3.56E-04	6.557	0.00005	
naphthalene	1.58E-05	6.557	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	3.0372
benzene	6.906	1211	220.79	1.9159
2,2,4 TMP	6.812	1257.8	220.74	0.9944
toluene	7.017	1377.6	222.64	0.5747
ethylbenzene	6.95	1419.3	212.61	0.1925
xylenes	7.009	1462.3	215.11	0.1685
cumene	6.929	1455.8	207.2	0.0930
naphthalene	7.146	1831.6	211.82	0.0053

MONTH August

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**1,016.83**	lb/month
			0.51	tons/month
Product Type			**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known		Q_{month}	**194,759.05**	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		**I**	1661.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**534.55**	°R
Average daily maximum ambient tempera		T_{AX}	541.10	°R
Average daily minimum ambient tempera		T_{AN}	528.00	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	535.80	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**537.08**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.424	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.143	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**133.62**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**732.07**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**127.55**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			37.901	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	6.4214	lb/month
		benzene	7.4358	lb/month
		2,2,4 TMP	9.0217	lb/month
		toluene	9.8025	lb/month
		ethylbenzene	0.8742	lb/month
		xylenes	4.0317	lb/month
		cumene	0.2116	lb/month
		naphthalene	0.1023	lb/month
Vapor Weight Concentrations Eq. 40- $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00623	
benzene	78.11	68	0.00706	
2,2,4 TMP	114.23	68	0.00813	
toluene	92.14	68	0.00821	
ethylbenzene	106.17	68	0.00055	
xylenes	106.17	68	0.00240	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.44E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.031568	6.424	0.00491	
benzene	0.039479	6.424	0.00615	
2,2,4 TMP	0.031104	6.424	0.00484	
toluene	0.038910	6.424	0.00606	
ethylbenzene	0.002253	6.424	0.00035	
xylenes	0.009862	6.424	0.00154	
cumene	3.43E-04	6.424	0.00005	
naphthalene	1.51E-05	6.424	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	2.9571
benzene	6.906	1211	220.79	1.8621
2,2,4 TMP	6.812	1257.8	220.74	0.9655
toluene	7.017	1377.6	222.64	0.5567
ethylbenzene	6.95	1419.3	212.61	0.1857
xylenes	7.009	1462.3	215.11	0.1626
cumene	6.929	1455.8	207.2	0.0895
naphthalene	7.146	1831.6	211.82	0.0051

MONTH September

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**1,675.38**	lb/month
			0.84	tons/month
Product Type			**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)		Q_{month}	**194,759.05**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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**	1328.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	521.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.95	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**529.98**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	9.802	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.269	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**222.21**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**23.59**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**1,217.47**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**212.11**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			39.796	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	6.9208	lb/month
		benzene	7.9177	lb/month
		2,2,4 TMP	9.5148	lb/month
		toluene	10.1708	lb/month
		ethylbenzene	0.8848	lb/month
		xylenes	4.0733	lb/month
		cumene	0.2118	lb/month
		naphthalene	0.1021	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00405	
benzene	78.11	60	0.00454	
2,2,4 TMP	114.23	60	0.00519	
toluene	92.14	60	0.00516	
ethylbenzene	106.17	60	0.00034	
xylenes	106.17	60	0.00147	
cumene	120.19	60	0.00006	
naphthalene	128.17	60	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	0.027688	9.802	0.00282	
benzene	0.034242	9.802	0.00349	
2,2,4 TMP	0.026783	9.802	0.00273	
toluene	0.033004	9.802	0.00337	
ethylbenzene	0.001865	9.802	0.00019	
xylenes	0.008143	9.802	0.00083	
cumene	2.79E-04	9.802	0.00003	
naphthalene	1.17E-05	9.802	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	2.4855
benzene	6.906	1211	220.79	1.5478
2,2,4 TMP	6.812	1257.8	220.74	0.7967
toluene	7.017	1377.6	222.64	0.4525
ethylbenzene	6.95	1419.3	212.61	0.1473
xylenes	7.009	1462.3	215.11	0.1287
cumene	6.929	1455.8	207.2	0.0698
naphthalene	7.146	1831.6	211.82	0.0038

MONTH **October**

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	1,200.99	lb/month
			0.60	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	194,759.05	barrels/month
Vapor Molecular weight		M_v	60.15	
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	969.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	516.65	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	509.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	517.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	518.13	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.921	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.192	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	158.40	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	23.59	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c$		LF	867.82	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	151.20	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			27.053	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	4.5940	lb/month
		benzene	5.2146	lb/month
		2,2,4 TMP	6.3542	lb/month
		toluene	6.8906	lb/month
		ethylbenzene	0.6566	lb/month
		xylenes	3.0719	lb/month
		cumene	0.1715	lb/month
		naphthalene	0.1001	lb/month
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_v$			
	M_i	M_v	Z_{Vi}	
hexane	86.18	60	0.00370	
benzene	78.11	60	0.00407	
2,2,4 TMP	114.23	60	0.00460	
toluene	92.14	60	0.00445	
ethylbenzene	106.17	60	0.00028	
xylenes	106.17	60	0.00121	
cumene	120.19	60	0.00005	
naphthalene	128.17	60	1.86E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.020464	7.921	0.00258	
benzene	0.024816	7.921	0.00313	
2,2,4 TMP	0.019168	7.921	0.00242	
toluene	0.023012	7.921	0.00291	
ethylbenzene	0.001244	7.921	0.00016	
xylenes	0.005416	7.921	0.00068	
cumene	1.80E-04	7.921	0.00002	
naphthalene	6.90E-06	7.921	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	1.8371
benzene	6.906	1211	220.79	1.1217
2,2,4 TMP	6.812	1257.8	220.74	0.5702
toluene	7.017	1377.6	222.64	0.3155
ethylbenzene	6.95	1419.3	212.61	0.0983
xylenes	7.009	1462.3	215.11	0.0856
cumene	6.929	1455.8	207.2	0.0452
naphthalene	7.146	1831.6	211.82	0.0022

MONTH **November**

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	925.61	lb/month
			0.46	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	194,759.05	barrels/month
Vapor Molecular weight		M_v	60.15	
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	630.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	507.05	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	500.90	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	507.52	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	508.01	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.552	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	121.35	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	23.59	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c$		LF	664.84	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	115.83	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			20.225	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	3.3122	lb/month
		benzene	3.7459	lb/month
		2,2,4 TMP	4.6530	lb/month
		toluene	5.1604	lb/month
		ethylbenzene	0.5402	lb/month
		xylenes	2.5625	lb/month
		cumene	0.1514	lb/month
		naphthalene	0.0991	lb/month
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_v$			
	M_i	M_v	Z_{Vi}	
hexane	86.18	60	0.00341	
benzene	78.11	60	0.00368	
2,2,4 TMP	114.23	60	0.00411	
toluene	92.14	60	0.00389	
ethylbenzene	106.17	60	0.00023	
xylenes	106.17	60	0.00101	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.40E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.015596	6.552	0.00238	
benzene	0.018578	6.552	0.00284	
2,2,4 TMP	0.014188	6.552	0.00217	
toluene	0.016640	6.552	0.00254	
ethylbenzene	0.000864	6.552	0.00013	
xylenes	0.003751	6.552	0.00057	
cumene	1.22E-04	6.552	0.00002	
naphthalene	4.30E-06	6.552	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	1.4001
benzene	6.906	1211	220.79	0.8398
2,2,4 TMP	6.812	1257.8	220.74	0.4221
toluene	7.017	1377.6	222.64	0.2282
ethylbenzene	6.95	1419.3	212.61	0.0683
xylenes	7.009	1462.3	215.11	0.0593
cumene	6.929	1455.8	207.2	0.0305
naphthalene	7.146	1831.6	211.82	0.0014

MONTH **December**

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	728.56	lb/month
			0.36	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	194,759.05	barrels/month
Vapor Molecular weight		M_v	60.15	
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	513.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	497.50	°R
Average daily maximum ambient temperature, Table 7.1-		T_{AX}	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	491.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	497.88	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	498.28	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.419	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.115	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	94.84	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	23.59	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c$		LF	519.61	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	90.53	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			15.738	lb/month
Individual HAP Monthly Emi	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	2.4463	lb/month
		benzene	2.7679	lb/month
		TMP	3.5310	lb/month
		toluene	4.0423	lb/month
		ethylbenzene	0.4675	lb/month
		xylenes	2.2453	lb/month
		cumene	0.1392	lb/month
		naphthalene	0.0986	lb/month
Vapor Weight Concentratior	$Z_{Vi} = y_iM_i / M_v$			
	M_i	M_v	Z_{Vi}	
hexane	86.18	60	0.00314	
benzene	78.11	60	0.00332	
2,2,4 TMP	114.23	60	0.00367	
toluene	92.14	60	0.00339	
ethylbenzene	106.17	60	0.00019	
xylenes	106.17	60	0.00084	
cumene	120.19	60	0.00003	
naphthalene	128.17	60	1.05E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.011860	5.419	0.00219	
benzene	0.013872	5.419	0.00256	
2,2,4 TMP	0.010474	5.419	0.00193	
toluene	0.012000	5.419	0.00221	
ethylbenzene	0.000598	5.419	0.00011	
xylenes	0.002588	5.419	0.00048	
cumene	8.19E-05	5.419	0.00002	
naphthalene	2.66E-06	5.419	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	1.0647
benzene	6.906	1211	220.79	0.6271
2,2,4 TMP	6.812	1257.8	220.74	0.3116
toluene	7.017	1377.6	222.64	0.1645
ethylbenzene	6.95	1419.3	212.61	0.0472
xylenes	7.009	1462.3	215.11	0.0409
cumene	6.929	1455.8	207.2	0.0205
naphthalene	7.146	1831.6	211.82	0.0009

IFRT TANK EMISSION CALCULATION

INPUT DATA

Input data in Green. Select Cells in Red to open the drop down selection list.

	Symbol		Units
Tank No. 6			
Nearest US Location		New York-Kennedy, NY	
Time Period		**Annual**	
Absolute Pressure	P_A	14.68	psi
Product Information			
Product Type (annual average, see below for monthly calcs)		Gasoline - RVP 13	
Vapor Molecular weight	M_v	**62**	Lb/lb-mole
Vapor Pressure Equation Constant A (Figure 7.1-15)	A	**11.64**	
Vapor Pressure Equation Constant B (Figure 7.1-15)	B	**5043.58**	°R
Average organic liquid density	W_L	**5.60**	lb/gal
Average Reid Vapor Pressure	RVP	**13.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Tank design data			
Shell height	Hs	**39.67**	ft
Diameter	D	**50.00**	ft
Throughput	Q	**42,034,274**	gal/yr
Turnovers	N	**75.96**	per year
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	**38.67**	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	**1.00**	ft
Liquid height (assume 1/2 Hs)	H_L	**19.84**	ft
Tank Construction (pick from drop down list)		Riveted	
Tank Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Internal floating roof design data			
Rim Seal Type:		Vapor-mounted seal | Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)		Average	
Number of fixed roof support columns	Nc	**4.00**	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columms; 1.0 if	Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	K_D	**0.14**	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	**2.2**	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	**0.0**	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	**0.0**	mph
Seal-related wind speed exponent; see Table 7.1-8	n	**4.3**	NA
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		Bolted	
Select Deck Construction Type		Continuous sheet	
If bolted continuous sheet or panel, enter width		5	
If bolted panel, also enter length			
Deck seam length factor; Length of Seam / Area of Deck	SD	**0.20**	ft/ft^2

Deck Fitting Data	**Type**	**Qty**	**Loss Factor Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	1	36.0	
Column Well	Built-up column, ungasketed sliding cover	4	51.0	
Unslotted Guidepole/Well	Gasketed sliding cover w/pole sleeve	0	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	0	11.0	
Gauge-float well (auto gauge)	Unbolted cover, ungasketed	1	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2	
Deck drain	Stub drain (1-inch diameter)	20	1.2	
Legs (IFR type)	IFR type, Adjustable	15	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7	
Ladder	Sliding cover, ungasketed	1	98.0	
Ladder/guidepole combination	Ladder sleeve, gasketed sliding cover	0	60.0	
Total deck fitting loss factor Eq. 2-14:			512.70	per year

ROUTINE EMISSIONS CALCULATIONS

	Symbol		Units
Total Losses (Eq.2-1 & 2-2: LT = LR+LW+LF+LD)	**LT**	**6,366.88**	lb/year
		3.18	ton/year
Data based on specific time averaging period			
True Vapor Pressure Eq. 1-25 PvA = exp(A-(B/TLA))	PvA	6.469	psia
Vapor pressure function; P*=PVA/PA/(1+(1-(PVA/PA))^0.5)^2	P*	0.144	
Daily total solar insolation on a horizontal surface	I	**1231.0**	Btu/ft^2-day
Rim Seal Losses (Eq.2-3: LR = (KRa + KRb v^n)DP* Mv Kc)	**LR**	**983.66**	lb/year
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.20	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.00	lb-mole/(mph)nft*yr
Average ambient wind speed at tank site; if IFR use Zero	v	0.00	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.30	NA
Vapor pressure function	P*	0.1442316	NA
Tank diameter	D	50.00	ft
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Withdrawal losses Eq.2-19: L_{WD}=(0.943*QC$_s$W$_L$/D)*[1+(N$_c$F$_c$/D)]	**LW**	**172.51**	lb/yr
Annual throughput	Q	1,000,816	bbl/yr
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft2
Average organic liquid density	W_L	5.60	lb/gal
Tank diameter	D	50.00	ft
Constant	0.943	0.943	1,000 ft3*gal/bbl2
Number of fixed roof support columns	Nc	4.00	NA
Effective column diameter; 1.1, 0.7, or 1.0	Fc	1.10	ft
Deck Fitting Losses (Eq.2-13: LF = FF P*MvKc)	**LF**	**4,584.75**	lb/yr
Total deck fitting loss factor; see Eq. 2-14	FF	512.70	lb-mole/year
Vapor pressure function; see Figure 7.1-19	P*	0.14	
Average vapor molecular weight	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Deck Seam Losses (Eq.2-18: LD = KDSDD2P*MvKc)	**LD**	**625.97**	lb/yr
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	0.14	lb-mole/ft-yr
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft2
Tank diameter	D	50.00	ft
Vapor pressure function; see Figure 7.1-19	P*	0.14	NA
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Average Daily Ambient Temperature; see Equation 1-30			
TAA = ((TAX+TAN)/2)	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Average Daily Liquid Surface Temperature (TLA) Eq 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	**TLA**	**515.88**	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	°R
Liquid bulk temperature (Equation 1-31)	TB	514.92	°R
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	**TB**	514.92	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	
Tank paint solar absorptance, dimensionless, Table 7.1-6	αs	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	Btu/(ft2 day)

HAPS Speciation

Product - select from list:			Gasoline	
Total HAP Annual Average Emissions			160.96	
Individual HAP Annual Average Emissi Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			26.325	lb/yr
benzene			30.039	lb/yr
TMP			37.249	lb/yr
toluene			41.314	lb/yr
ethylbenzene			4.221	lb/yr
xylenes			19.930	lb/yr
cumene			1.157	lb/yr
naphthalene			0.728	lb/yr
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00397	
benzene	78.11	62	0.00435	
2,2,4 TMP	114.23	62	0.00490	
toluene	92.14	62	0.00472	
ethylbenzene	106.17	62	0.00029	
xylenes	106.17	62	0.00127	
cumene	120.19	62	0.00005	
naphthalene	128.17	62	1.91E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.018482	6.469	0.00286	
benzene	0.022325	6.469	0.00345	
2,2,4 TMP	0.017202	6.469	0.00266	
toluene	0.020546	6.469	0.00318	
ethylbenzene	0.001101	6.469	0.00017	
xylenes	0.004790	6.469	0.00074	
cumene	1.59E-04	6.469	0.00002	
naphthalene	5.97E-06	6.469	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	1.7313
benzene	6.906	1211	220.79	1.0530
2,2,4 TMP	6.812	1257.8	220.74	0.5340
toluene	7.017	1377.6	222.64	0.2940
ethylbenzene	6.95	1419.3	212.61	0.0908
xylenes	7.009	1462.3	215.11	0.0790
cumene	6.929	1455.8	207.2	0.0415
naphthalene	7.146	1831.6	211.82	0.0020

MONTHLY IFRT TANK VOC AND HAP ESTIMATIONS

INPUT DATA	Symbol		Units
Tank No. 6			
Nearest US Location		New York-Kennedy, NY	
Absolute Pressure	P_A	14.68	psi
Product Information			
Average organic liquid density	W_L	**5.60**	lb/gal
Average Reid Vapor Pressure	RVP	**13.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	K_c	**1.00**	
Tank design data		**0**	
Shell height	Hs	**39.67**	ft
Diameter	D	**50.00**	ft
Throughput	Q	**3,502,856**	gal/month
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	**38.67**	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	**1.00**	ft
Liquid height (assume 1/2 Hs)	H_L	**19.84**	ft
Tank Construction (pick from drop down list)		**Riveted**	
Tank Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	

Internal floating roof design data			
Rim Seal Type:		**Vapor-mounted seal | Rim-mounted secondary**	
Rim Seal Fit (Average or Tight fitting)		**Average**	
Number of fixed roof support columns	Nc	**4.00**	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columms; 1.0 if	Fc	**1.10**	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	**0.14**	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	KRa	**2.2**	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	KRb	**0.0**	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	**0.0**	mph
Seal-related wind speed exponent; see Table 7.1-8	n	**4.3**	NA
Shell clingage factor; see Table 7.1-10	Cs	**0.0015**	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		**Bolted**	
Select Deck Construction Type		**Continuous sheet**	
If bolted continuous sheet or panel, enter width		**5**	
If bolted panel, also enter length		**0**	
Deck seam length factor; Length of Seam / Area of Deck	SD	**0.20**	ft/ft^2
		Loss Factor	

Deck Fitting Data		**Qty**	**Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	**1**	36.0	
Column Well	Built-up column, ungasketed sliding cover	**4**	51.0	
Unslotted Guidepole and Well	Gasketed sliding cover w/pole sleeve	**0**	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	**0**	11.0	
Gauge-float well (automatic gau	Unbolted cover, ungasketed	**1**	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	**1**	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	**1**	6.2	
Deck drain	Stub drain (1-inch diameter)	**20**	1.2	
Legs (IFR type)	IFR type, Adjustable	**15**	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	**0**	0.7	
Ladder	Sliding cover, ungasketed	**1**	98.0	
Ladder / Guide-Pole Combinati	Ladder sleeve, gasketed sliding cover	**0**	60.0	
	Monthly deck fitting loss factor:	F_F	42.73	per month

MONTH January

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**369.93**	lb/month
		0.18	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	83,401.34	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	588.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	486.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	493.29	
Average Daily Liquid Surface Temperature Eq. 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**493.75**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	4.948	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.102	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months	L_R	**56.46**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**263.16**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)$/12 months	**LD**	**35.93**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		8.227	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		1.2137	lb/month
benzene		1.3830	lb/month
TMP		1.8095	lb/month
toluene		2.1344	lb/month
ethylbenzene		0.2647	lb/month
xylenes		1.2807	lb/month
cumene		0.0816	lb/month
naphthalene		0.0600	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00301
benzene	78.11	60	0.00316
2,2,4 TMP	114.23	60	0.00347
toluene	92.14	60	0.00317
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00077
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.10E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010392	4.948	0.00210
benzene	0.012047	4.948	0.00243
2,2,4 TMP	0.009046	4.948	0.00183
toluene	0.010248	4.948	0.00207
ethylbenzene	0.000500	4.948	0.00010
xylenes	0.002163	4.948	0.00044
cumene	6.75E-05	4.948	0.00001
naphthalene	2.11E-06	4.948	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	0.9329
benzene	6.906	1211	220.79	0.5446
2,2,4 TMP	6.812	1257.8	220.74	0.2691
toluene	7.017	1377.6	222.64	0.1405
ethylbenzene	6.95	1419.3	212.61	0.0395
xylenes	7.009	1462.3	215.11	0.0342
cumene	6.929	1455.8	207.2	0.0169
naphthalene	7.146	1831.6	211.82	0.0007

MONTH February

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**386.38**	lb/month
		0.19	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	83,401.34	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	861.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	487.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	494.90	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**495.56**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	5.133	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.107	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months	L_R	**59.07**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**275.34**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)$/12 months	**LD**	**37.59**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		8.572	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		1.2819	lb/month
benzene		1.4590	lb/month
TMP		1.8960	lb/month
toluene		2.2188	lb/month
ethylbenzene		0.2700	lb/month
xylenes		1.3038	lb/month
cumene		0.0824	lb/month
naphthalene		0.0600	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00306
benzene	78.11	60	0.00323
2,2,4 TMP	114.23	60	0.00355
toluene	92.14	60	0.00326
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00080
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.63E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010960	5.133	0.00214
benzene	0.012752	5.133	0.00248
2,2,4 TMP	0.009597	5.133	0.00187
toluene	0.010921	5.133	0.00213
ethylbenzene	0.000538	5.133	0.00010
xylenes	0.002325	5.133	0.00045
cumene	7.30E-05	5.133	0.00001
naphthalene	2.32E-06	5.133	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	0.9839
benzene	6.906	1211	220.79	0.5764
2,2,4 TMP	6.812	1257.8	220.74	0.2855
toluene	7.017	1377.6	222.64	0.1497
ethylbenzene	6.95	1419.3	212.61	0.0425
xylenes	7.009	1462.3	215.11	0.0367
cumene	6.929	1455.8	207.2	0.0183
naphthalene	7.146	1831.6	211.82	0.0007

MONTH March

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**461.49**	lb/month
		0.23	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	83,401.34	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	1175.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	494.30	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	501.98	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**502.89**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{vA}	5.935	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.129	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months	L_R	**71.00**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**330.93**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)$/12 months	**LD**	**45.18**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		10.219	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
hexane		1.6036	lb/month
benzene		1.8201	lb/month
2,2,4 TMP		2.3085	lb/month
toluene		2.6263	lb/month
ethylbenzene		0.2961	lb/month
xylenes		1.4175	lb/month
cumene		0.0868	lb/month
naphthalene		0.0602	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00327
benzene	78.11	60	0.00349
2,2,4 TMP	114.23	60	0.00388
toluene	92.14	60	0.00362
ethylbenzene	106.17	60	0.00021
xylenes	106.17	60	0.00092
cumene	120.19	60	0.00003
naphthalene	128.17	60	1.20E-06

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.013525	5.935	0.00228
benzene	0.015959	5.935	0.00269
2,2,4 TMP	0.012116	5.935	0.00204
toluene	0.014037	5.935	0.00237
ethylbenzene	0.000713	5.935	0.00012
xylenes	0.003092	5.935	0.00052
cumene	9.91E-05	5.935	0.00002
naphthalene	3.35E-06	5.935	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	1.2141
benzene	6.906	1211	220.79	0.7214
2,2,4 TMP	6.812	1257.8	220.74	0.3604
toluene	7.017	1377.6	222.64	0.1925
ethylbenzene	6.95	1419.3	212.61	0.0564
xylenes	7.009	1462.3	215.11	0.0489
cumene	6.929	1455.8	207.2	0.0248
naphthalene	7.146	1831.6	211.82	0.0011

MONTH **April**

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	597.58	lb/month
			0.30	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	60.15	
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	1516.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	510.90	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	503.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	512.04	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	513.21	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.230	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.168	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	92.61	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	14.38	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	431.66	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	58.93	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			13.456	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	2.2197	lb/month
		benzene	2.5210	lb/month
		2,2,4 TMP	3.1165	lb/month
		toluene	3.4400	lb/month
		ethylbenzene	0.3500	lb/month
		xylenes	1.6528	lb/month
		cumene	0.0960	lb/month
		naphthalene	0.0606	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00356	
benzene	78.11	60	0.00388	
2,2,4 TMP	114.23	60	0.00436	
toluene	92.14	60	0.00417	
ethylbenzene	106.17	60	0.00026	
xylenes	106.17	60	0.00111	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.62E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.017962	7.230	0.00248	
benzene	0.021597	7.230	0.00299	
2,2,4 TMP	0.016591	7.230	0.00229	
toluene	0.019696	7.230	0.00272	
ethylbenzene	0.001045	7.230	0.00014	
xylenes	0.004541	7.230	0.00063	
cumene	1.49E-04	7.230	0.00002	
naphthalene	5.50E-06	7.230	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	1.6125
benzene	6.906	1211	220.79	0.9762
2,2,4 TMP	6.812	1257.8	220.74	0.4935
toluene	7.017	1377.6	222.64	0.2701
ethylbenzene	6.95	1419.3	212.61	0.0825
xylenes	7.009	1462.3	215.11	0.0717
cumene	6.929	1455.8	207.2	0.0374
naphthalene	7.146	1831.6	211.82	0.0018

MONTH **May**

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	411.65	lb/month
			0.21	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	68.00	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1760.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	520.10	°R
Average daily maximum ambient temperature, Table		T_{AX}	527.50	°R
Average daily minimum ambient temperature, Table		T_{AN}	512.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	521.42	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	522.78	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.901	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.101	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	63.09	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	14.38	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	294.04	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	40.15	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			14.753	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	2.4172	lb/month
		benzene	2.7773	lb/month
		2,2,4 TMP	3.4342	lb/month
		toluene	3.8041	lb/month
		ethylbenzene	0.3787	lb/month
		xylenes	1.7795	lb/month
		cumene	0.1013	lb/month
		naphthalene	0.0609	lb/month
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00572	
benzene	78.11	68	0.00634	
2,2,4 TMP	114.23	68	0.00720	
toluene	92.14	68	0.00704	
ethylbenzene	106.17	68	0.00045	
xylenes	106.17	68	0.00195	
cumene	120.19	68	0.00007	
naphthalene	128.17	68	3.14E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.022129	4.901	0.00452	
benzene	0.027047	4.901	0.00552	
2,2,4 TMP	0.020997	4.901	0.00428	
toluene	0.025471	4.901	0.00520	
ethylbenzene	0.001402	4.901	0.00029	
xylenes	0.006109	4.901	0.00125	
cumene	2.06E-04	4.901	0.00004	
naphthalene	8.16E-06	4.901	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	2.0729
benzene	6.906	1211	220.79	1.2758
2,2,4 TMP	6.812	1257.8	220.74	0.6518
toluene	7.017	1377.6	222.64	0.3644
ethylbenzene	6.95	1419.3	212.61	0.1155
xylenes	7.009	1462.3	215.11	0.1007
cumene	6.929	1455.8	207.2	0.0537
naphthalene	7.146	1831.6	211.82	0.0027

MONTH **June**

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	518.98	lb/month
			0.26	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	68.00	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1898.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	529.85	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	522.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.27	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	532.74	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.927	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.129	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	80.13	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	14.38	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	373.48	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	50.99	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			19.202	lb/month
Individual HAP Monthly Emissio	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	3.2093	lb/month
		benzene	3.7101	lb/month
		TMP	4.5342	lb/month
		toluene	4.9650	lb/month
		ethylbenzene	0.4615	lb/month
		xylenes	2.1438	lb/month
		cumene	0.1162	lb/month
		naphthalene	0.0617	lb/month
Vapor Weight Concentrations Ec $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00608	
benzene	78.11	68	0.00684	
2,2,4 TMP	114.23	68	0.00785	
toluene	92.14	68	0.00785	
ethylbenzene	106.17	68	0.00052	
xylenes	106.17	68	0.00225	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.01E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.028411	5.927	0.00479	
benzene	0.035291	5.927	0.00595	
2,2,4 TMP	0.027683	5.927	0.00467	
toluene	0.034315	5.927	0.00579	
ethylbenzene	0.001958	5.927	0.00033	
xylenes	0.008557	5.927	0.00144	
cumene	2.95E-04	5.927	0.00005	
naphthalene	1.26E-05	5.927	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	2.6614
benzene	6.906	1211	220.79	1.6646
2,2,4 TMP	6.812	1257.8	220.74	0.8593
toluene	7.017	1377.6	222.64	0.4910
ethylbenzene	6.95	1419.3	212.61	0.1614
xylenes	7.009	1462.3	215.11	0.1411
cumene	6.929	1455.8	207.2	0.0770
naphthalene	7.146	1831.6	211.82	0.0042

MONTH July				
ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**590.93**	lb/month
			0.30	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1867.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**535.35**	°R
Average daily maximum ambient temperature, Ta		T_{AX}	542.10	°R
Average daily minimum ambient temperature, Tal		T_{AN}	528.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	536.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**538.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.557	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**91.56**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**426.74**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**58.26**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			22.339	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	3.7569	lb/month
		benzene	4.3612	lb/month
		2,2,4 TMP	5.3070	lb/month
		toluene	5.7923	lb/month
		ethylbenzene	0.5218	lb/month
		xylenes	2.4098	lb/month
		cumene	0.1272	lb/month
		naphthalene	0.0623	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	68	0.00627	
benzene	78.11	68	0.00712	
2,2,4 TMP	114.23	68	0.00821	
toluene	92.14	68	0.00830	
ethylbenzene	106.17	68	0.00056	
xylenes	106.17	68	0.00243	
cumene	120.19	68	0.00010	
naphthalene	128.17	68	4.55E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.032424	6.557	0.00494	
benzene	0.040618	6.557	0.00619	
2,2,4 TMP	0.032037	6.557	0.00489	
toluene	0.040170	6.557	0.00613	
ethylbenzene	0.002335	6.557	0.00036	
xylenes	0.010223	6.557	0.00156	
cumene	3.56E-04	6.557	0.00005	
naphthalene	1.58E-05	6.557	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	3.0372
benzene	6.906	1211	220.79	1.9159
2,2,4 TMP	6.812	1257.8	220.74	0.9944
toluene	7.017	1377.6	222.64	0.5747
ethylbenzene	6.95	1419.3	212.61	0.1925
xylenes	7.009	1462.3	215.11	0.1685
cumene	6.929	1455.8	207.2	0.0930
naphthalene	7.146	1831.6	211.82	0.0053

MONTH August				
ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**575.34**	lb/month
			0.29	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1661.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**534.55**	°R
Average daily maximum ambient tempera		T_{AX}	541.10	°R
Average daily minimum ambient tempera		T_{AN}	528.00	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	535.80	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**537.08**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.424	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.143	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ month		L_R	**89.08**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**415.19**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**56.69**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			21.649	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	3.6372	lb/month
		benzene	4.2186	lb/month
		2,2,4 TMP	5.1374	lb/month
		toluene	5.6100	lb/month
		ethylbenzene	0.5085	lb/month
		xylenes	2.3508	lb/month
		cumene	0.1248	lb/month
		naphthalene	0.0621	lb/month
Vapor Weight Concentrations Eq. 40- $Z_{Vi} = y_iM_i / M_V$				
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	68	0.00623	
benzene	78.11	68	0.00706	
2,2,4 TMP	114.23	68	0.00813	
toluene	92.14	68	0.00821	
ethylbenzene	106.17	68	0.00055	
xylenes	106.17	68	0.00240	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.44E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.031568	6.424	0.00491	
benzene	0.039479	6.424	0.00615	
2,2,4 TMP	0.031104	6.424	0.00484	
toluene	0.038910	6.424	0.00606	
ethylbenzene	0.002253	6.424	0.00035	
xylenes	0.009862	6.424	0.00154	
cumene	3.43E-04	6.424	0.00005	
naphthalene	1.51E-05	6.424	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	2.9571
benzene	6.906	1211	220.79	1.8621
2,2,4 TMP	6.812	1257.8	220.74	0.9655
toluene	7.017	1377.6	222.64	0.5567
ethylbenzene	6.95	1419.3	212.61	0.1857
xylenes	7.009	1462.3	215.11	0.1626
cumene	6.929	1455.8	207.2	0.0895
naphthalene	7.146	1831.6	211.82	0.0051

MONTH September				
ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**947.27**	lb/month
			0.47	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	1328.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	521.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.95	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**529.98**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	9.802	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.269	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**148.14**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**690.48**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**94.27**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			22.720	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	3.9193	lb/month
		benzene	4.4907	lb/month
		2,2,4 TMP	5.4159	lb/month
		toluene	5.8180	lb/month
		ethylbenzene	0.5145	lb/month
		xylenes	2.3743	lb/month
		cumene	0.1249	lb/month
		naphthalene	0.0620	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00405	
benzene	78.11	60	0.00454	
2,2,4 TMP	114.23	60	0.00519	
toluene	92.14	60	0.00516	
ethylbenzene	106.17	60	0.00034	
xylenes	106.17	60	0.00147	
cumene	120.19	60	0.00006	
naphthalene	128.17	60	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	0.027688	9.802	0.00282	
benzene	0.034242	9.802	0.00349	
2,2,4 TMP	0.026783	9.802	0.00273	
toluene	0.033004	9.802	0.00337	
ethylbenzene	0.001865	9.802	0.00019	
xylenes	0.008143	9.802	0.00083	
cumene	2.79E-04	9.802	0.00003	
naphthalene	1.17E-05	9.802	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	2.4855
benzene	6.906	1211	220.79	1.5478
2,2,4 TMP	6.812	1257.8	220.74	0.7967
toluene	7.017	1377.6	222.64	0.4525
ethylbenzene	6.95	1419.3	212.61	0.1473
xylenes	7.009	1462.3	215.11	0.1287
cumene	6.929	1455.8	207.2	0.0698
naphthalene	7.146	1831.6	211.82	0.0038

MONTH October

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**679.35**	lb/month
			0.34	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	969.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	509.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	517.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**518.13**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.921	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.192	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**105.60**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**492.18**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**67.20**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			15.523	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	2.6051	lb/month
		benzene	2.9640	lb/month
		2,2,4 TMP	3.6309	lb/month
		toluene	3.9655	lb/month
		ethylbenzene	0.3856	lb/month
		xylenes	1.8087	lb/month
		cumene	0.1021	lb/month
		naphthalene	0.0609	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00370	
benzene	78.11	60	0.00407	
2,2,4 TMP	114.23	60	0.00460	
toluene	92.14	60	0.00445	
ethylbenzene	106.17	60	0.00028	
xylenes	106.17	60	0.00121	
cumene	120.19	60	0.00005	
naphthalene	128.17	60	1.86E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.020464	7.921	0.00258	
benzene	0.024816	7.921	0.00313	
2,2,4 TMP	0.019168	7.921	0.00242	
toluene	0.023012	7.921	0.00291	
ethylbenzene	0.001244	7.921	0.00016	
xylenes	0.005416	7.921	0.00068	
cumene	1.80E-04	7.921	0.00002	
naphthalene	6.90E-06	7.921	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	1.8371
benzene	6.906	1211	220.79	1.1217
2,2,4 TMP	6.812	1257.8	220.74	0.5702
toluene	7.017	1377.6	222.64	0.3155
ethylbenzene	6.95	1419.3	212.61	0.0983
xylenes	7.009	1462.3	215.11	0.0856
cumene	6.929	1455.8	207.2	0.0452
naphthalene	7.146	1831.6	211.82	0.0022

MONTH November

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**523.82**	lb/month
			0.26	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	630.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	500.90	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	507.52	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**508.01**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.552	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**80.90**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**377.06**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**51.48**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			11.666	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	1.8812	lb/month
		benzene	2.1346	lb/month
		2,2,4 TMP	2.6701	lb/month
		toluene	2.9883	lb/month
		ethylbenzene	0.3198	lb/month
		xylenes	1.5210	lb/month
		cumene	0.0908	lb/month
		naphthalene	0.0604	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00341	
benzene	78.11	60	0.00368	
2,2,4 TMP	114.23	60	0.00411	
toluene	92.14	60	0.00389	
ethylbenzene	106.17	60	0.00023	
xylenes	106.17	60	0.00101	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.40E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.015596	6.552	0.00238	
benzene	0.018578	6.552	0.00284	
2,2,4 TMP	0.014188	6.552	0.00217	
toluene	0.016640	6.552	0.00254	
ethylbenzene	0.000864	6.552	0.00013	
xylenes	0.003751	6.552	0.00057	
cumene	1.22E-04	6.552	0.00002	
naphthalene	4.30E-06	6.552	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	1.4001
benzene	6.906	1211	220.79	0.8398
2,2,4 TMP	6.812	1257.8	220.74	0.4221
toluene	7.017	1377.6	222.64	0.2282
ethylbenzene	6.95	1419.3	212.61	0.0683
xylenes	7.009	1462.3	215.11	0.0593
cumene	6.929	1455.8	207.2	0.0305
naphthalene	7.146	1831.6	211.82	0.0014

MONTH December

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**412.53**	lb/month
			0.21	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	83,401.34	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	513.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	491.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	497.88	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**498.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.419	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.115	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**63.23**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**14.38**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**294.69**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**40.24**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			9.132	lb/month
Individual HAP Monthly Emi	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	1.3922	lb/month
		benzene	1.5822	lb/month
		TMP	2.0364	lb/month
		toluene	2.3568	lb/month
		ethylbenzene	0.2788	lb/month
		xylenes	1.3419	lb/month
		cumene	0.0839	lb/month
		naphthalene	0.0601	lb/month
Vapor Weight Concentratior	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00314	
benzene	78.11	60	0.00332	
2,2,4 TMP	114.23	60	0.00367	
toluene	92.14	60	0.00339	
ethylbenzene	106.17	60	0.00019	
xylenes	106.17	60	0.00084	
cumene	120.19	60	0.00003	
naphthalene	128.17	60	1.05E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.011860	5.419	0.00219	
benzene	0.013872	5.419	0.00256	
2,2,4 TMP	0.010474	5.419	0.00193	
toluene	0.012000	5.419	0.00221	
ethylbenzene	0.000598	5.419	0.00011	
xylenes	0.002588	5.419	0.00048	
cumene	8.19E-05	5.419	0.00002	
naphthalene	2.66E-06	5.419	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	1.0647
benzene	6.906	1211	220.79	0.6271
2,2,4 TMP	6.812	1257.8	220.74	0.3116
toluene	7.017	1377.6	222.64	0.1645
ethylbenzene	6.95	1419.3	212.61	0.0472
xylenes	7.009	1462.3	215.11	0.0409
cumene	6.929	1455.8	207.2	0.0205
naphthalene	7.146	1831.6	211.82	0.0009

IFRT TANK EMISSION CALCULATION

INPUT DATA

Input data in Green. Select Cells in Red to open the drop down selection list.

	Symbol		Units
Tank No. 7			
Nearest US Location		New York-Kennedy, NY	
Time Period		Annual	
Absolute Pressure	P_A	14.68	psi
Product Information			
Product Type (annual average, see below for monthly calcs)		Gasoline - RVP 13	
Vapor Molecular weight	M_v	62	Lb/lb-mole
Vapor Pressure Equation Constant A (Figure 7.1-15)	A	11.64	
Vapor Pressure Equation Constant B (Figure 7.1-15)	B	5043.58	°R
Average organic liquid density	W_L	5.60	lb/gal
Average Reid Vapor Pressure	RVP	13.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Tank design data			
Shell height	Hs	39.67	ft
Diameter	D	55.00	ft
Throughput	Q	51,913,628	gal/yr
Turnovers	N	77.53	per year
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	38.67	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	1.00	ft
Liquid height (assume 1/2 Hs)	H_L	19.84	ft
Tank Construction (pick from drop down list)		Riveted	
Tank Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Internal floating roof design data			
Rim Seal Type:		Vapor-mounted seal | Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)		Average	
Number of fixed roof support columns	Nc	4.00	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columms; 1.0 if	Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	K_D	0.14	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.2	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.0	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	0.0	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.3	NA
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		Bolted	
Select Deck Construction Type		Continuous sheet	
If bolted continuous sheet or panel, enter width		5	
If bolted panel, also enter length			
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft^2

Deck Fitting Data	Type	Qty	Loss Factor Kf (Table 7.1-12)	
Access Hatch	Unbolted cover, ungasketed	1	36.0	
Column Well	Built-up column, ungasketed sliding cover	4	51.0	
Unslotted Guidepole/Well	Gasketed sliding cover w/pole sleeve	0	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	0	11.0	
Gauge-float well (auto gauge)	Unbolted cover, ungasketed	1	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2	
Deck drain	Stub drain (1-inch diameter)	25	1.2	
Legs (IFR type)	IFR type, Adjustable	16	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7	
Ladder	Sliding cover, ungasketed	1	98.0	
Ladder/guidepole combination	Ladder sleeve, gasketed sliding cover	0	60.0	
Total deck fitting loss factor Eq. 2-14:			526.60	per year

ROUTINE EMISSIONS CALCULATIONS

	Symbol		Units
Total Losses (Eq.2-1 & 2-2: LT = LR+LW+LF+LD)	**LT**	**6,740.75**	lb/year
		3.37	ton/year
Data based on specific time averaging period			
True Vapor Pressure Eq. 1-25 PvA = exp(A-(B/TLA))	PvA	6.469	psia
Vapor pressure function; P*=PVA/PA/(1+(1-(PVA/PA))^0.5)^2	P*	0.144	
Daily total solar insolation on a horizontal surface	I	**1231.0**	Btu/ft^2-day
Rim Seal Losses (Eq.2-3: LR = (KRa + KRb v^n)DP* Mv Kc)	**LR**	**1,082.03**	lb/year
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.20	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.00	lb-mole/(mph)nft*yr
Average ambient wind speed at tank site; if IFR use Zero	v	0.00	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.30	NA
Vapor pressure function	P*	0.1442316	NA
Tank diameter	D	55.00	ft
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Withdrawal losses Eq.2-19: $L_{WD}=(0.943*QC_sW_L/D)*[1+(N_cF_c/D)]$	**LW**	**192.26**	lb/yr
Annual throughput	Q	1,236,039	bbl/yr
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft2
Average organic liquid density	W_L	5.60	lb/gal
Tank diameter	D	55.00	ft
Constant	0.943	0.943	1,000 ft3*gal/bbl2
Number of fixed roof support columns	Nc	4.00	NA
Effective column diameter; 1.1, 0.7, or 1.0	Fc	1.10	ft
Deck Fitting Losses (Eq.2-13: LF = FF P*MvKc)	**LF**	**4,709.05**	lb/yr
Total deck fitting loss factor; see Eq. 2-14	FF	526.60	lb-mole/year
Vapor pressure function; see Figure 7.1-19	P*	0.14	
Average vapor molecular weight	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Deck Seam Losses (Eq.2-18: LD = KDSDD2P*MvKc)	**LD**	**757.42**	lb/yr
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	0.14	lb-mole/ft-yr
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft2
Tank diameter	D	55.00	ft
Vapor pressure function; see Figure 7.1-19	P*	0.14	NA
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Average Daily Ambient Temperature; see Equation 1-30			
TAA = ((TAX+TAN)/2)	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Average Daily Liquid Surface Temperature (TLA) Eq 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	**TLA**	**515.88**	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	°R
Liquid bulk temperature (Equation 1-31)	TB	514.92	°R
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	**TB**	514.92	°R
Average daily ambient temperature (Equation 1-30)	TAA	514.00	
Tank paint solar absorptance, dimensionless, Table 7.1-6	αs	0.25	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	Btu/(ft2 day)

HAPS Speciation

Product - select from list:			Gasoline	
Total HAP Annual Average Emissions			172.45	
Individual HAP Annual Average Emissi Eq. 40-2 $L_{Ti}=Z_{Vi}(L_R+L_F+L_D)+Z_{Li}L_W$				
			L_{Ti}	
hexane			27.929	lb/yr
benzene			31.934	lb/yr
TMP			39.774	lb/yr
toluene			44.369	lb/yr
ethylbenzene			4.600	lb/yr
xylenes			21.762	lb/yr
cumene			1.273	lb/yr
naphthalene			0.810	lb/yr
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi}=y_iM_i/M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00397	
benzene	78.11	62	0.00435	
2,2,4 TMP	114.23	62	0.00490	
toluene	92.14	62	0.00472	
ethylbenzene	106.17	62	0.00029	
xylenes	106.17	62	0.00127	
cumene	120.19	62	0.00005	
naphthalene	128.17	62	1.91E-06	
Vapor Mole Fraction Eq. 40-5 $y_i=P_i/P_{VA}$				
	$P_i=P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.018482	6.469	0.00286	
benzene	0.022325	6.469	0.00345	
2,2,4 TMP	0.017202	6.469	0.00266	
toluene	0.020546	6.469	0.00318	
ethylbenzene	0.001101	6.469	0.00017	
xylenes	0.004790	6.469	0.00074	
cumene	1.59E-04	6.469	0.00002	
naphthalene	5.97E-06	6.469	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	1.7313
benzene	6.906	1211	220.79	1.0530
2,2,4 TMP	6.812	1257.8	220.74	0.5340
toluene	7.017	1377.6	222.64	0.2940
ethylbenzene	6.95	1419.3	212.61	0.0908
xylenes	7.009	1462.3	215.11	0.0790
cumene	6.929	1455.8	207.2	0.0415
naphthalene	7.146	1831.6	211.82	0.0020

MONTHLY IFRT TANK VOC AND HAP ESTIMATIONS

INPUT DATA		Symbol		Units
Tank No.	7			
Nearest US Location			New York-Kennedy, NY	
Absolute Pressure		P_A	14.68	psi
Product Information				
Average organic liquid density		W_L	5.60	lb/gal
Average Reid Vapor Pressure		RVP	13.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids		K_c	1.00	
Tank design data			0	
Shell height		Hs	39.67	ft
Diameter		D	55.00	ft
Throughput		Q	4,326,136	gal/month
Maximum Filling Height (use Hs-1 if unknown)		H_{LX}	38.67	ft
Minimum Filling Height (use 1 if unknown)		H_{LN}	1.00	ft
Liquid height (assume 1/2 Hs)		H_L	19.84	ft
Tank Construction (pick from drop down list)			Riveted	
Tank Color (pick from drop down list)			White	
Tank Shell Condition (pick from drop down list)			Average	
Tank Interior Condition (pick from drop down list)			Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6		α	0.25	
Internal floating roof design data				
Rim Seal Type:		Vapor-mounted seal	Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)			Average	
Number of fixed roof support columns		Nc	4.00	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columns; 1.0 if		Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14		KD	0.14	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8		KRa	2.2	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8		KRb	0.0	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero		v	0.0	mph
Seal-related wind speed exponent; see Table 7.1-8		n	4.3	NA
Shell clingage factor; see Table 7.1-10		Cs	0.0015	bbl/1,000 ft^2
Deck Design Data				
Deck Seam (choose Welded or Bolted)			Bolted	
Select Deck Construction Type			Continuous sheet	
If bolted continuous sheet or panel, enter width			5	
If bolted panel, also enter length			0	
Deck seam length factor; Length of Seam / Area of Deck		SD	0.20	ft/ft^2
			Loss Factor	
Deck Fitting Data		**Qty**	**Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	1	36.0	
Column Well	Built-up column, ungasketed sliding cover	4	51.0	
Unslotted Guidepole and Well	Gasketed sliding cover w/pole sleeve	0	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	0	11.0	
Gauge-float well (automatic ga	Unbolted cover, ungasketed	1	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2	
Deck drain	Stub drain (1-inch diameter)	25	1.2	
Legs (IFR type)	IFR type, Adjustable	16	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7	
Ladder	Sliding cover, ungasketed	1	98.0	
Ladder / Guide-Pole Combinati	Ladder sleeve, gasketed sliding cover	0	60.0	
	Monthly deck fitting loss factor:	F_F	43.88	per month

MONTH January

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	LT	**391.90**	lb/month
		0.20	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	103,003.23	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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	588.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	486.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	493.29	
Average Daily Liquid Surface Temperature Eq. 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**493.75**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	4.948	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.102	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**62.11**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c$	LF	**270.30**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	LD	**43.48**	lb/month

HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			8.888	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	1.2913	lb/month
		benzene	1.4769	lb/month
		TMP	1.9460	lb/month
		toluene	2.3141	lb/month
		ethylbenzene	0.2914	lb/month
		xylenes	1.4116	lb/month
		cumene	0.0904	lb/month
		naphthalene	0.0668	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00301
benzene	78.11	60	0.00316
2,2,4 TMP	114.23	60	0.00347
toluene	92.14	60	0.00317
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00077
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.10E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010392	4.948	0.00210
benzene	0.012047	4.948	0.00243
2,2,4 TMP	0.009046	4.948	0.00183
toluene	0.010248	4.948	0.00207
ethylbenzene	0.000500	4.948	0.00010
xylenes	0.002163	4.948	0.00044
cumene	6.75E-05	4.948	0.00001
naphthalene	2.11E-06	4.948	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	0.9329
benzene	6.906	1211	220.79	0.5446
2,2,4 TMP	6.812	1257.8	220.74	0.2691
toluene	7.017	1377.6	222.64	0.1405
ethylbenzene	6.95	1419.3	212.61	0.0395
xylenes	7.009	1462.3	215.11	0.0342
cumene	6.929	1455.8	207.2	0.0169
naphthalene	7.146	1831.6	211.82	0.0007

MONTH February

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	LT	**409.29**	lb/month
		0.20	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	103,003.23	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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	861.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	487.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	494.90	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**495.56**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.133	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.107	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**64.98**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c$	LF	**282.80**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	LD	**45.49**	lb/month

HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			9.253	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	1.3634	lb/month
		benzene	1.5573	lb/month
		TMP	2.0373	lb/month
		toluene	2.4034	lb/month
		ethylbenzene	0.2970	lb/month
		xylenes	1.4360	lb/month
		cumene	0.0913	lb/month
		naphthalene	0.0669	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00306
benzene	78.11	60	0.00323
2,2,4 TMP	114.23	60	0.00355
toluene	92.14	60	0.00326
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00080
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.63E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010960	5.133	0.00214
benzene	0.012752	5.133	0.00248
2,2,4 TMP	0.009597	5.133	0.00187
toluene	0.010921	5.133	0.00213
ethylbenzene	0.000538	5.133	0.00010
xylenes	0.002325	5.133	0.00045
cumene	7.30E-05	5.133	0.00001
naphthalene	2.32E-06	5.133	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	0.9839
benzene	6.906	1211	220.79	0.5764
2,2,4 TMP	6.812	1257.8	220.74	0.2855
toluene	7.017	1377.6	222.64	0.1497
ethylbenzene	6.95	1419.3	212.61	0.0425
xylenes	7.009	1462.3	215.11	0.0367
cumene	6.929	1455.8	207.2	0.0183
naphthalene	7.146	1831.6	211.82	0.0007

MONTH March

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	LT	**488.70**	lb/month
		0.24	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	103,003.23	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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	1175.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	494.30	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	501.98	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**502.89**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.935	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.129	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**78.10**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c$	LF	**339.90**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	LD	**54.67**	lb/month

HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			10.994	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	1.7036	lb/month
		benzene	1.9390	lb/month
		2,2,4 TMP	2.4734	lb/month
		toluene	2.8342	lb/month
		ethylbenzene	0.3246	lb/month
		xylenes	1.5563	lb/month
		cumene	0.0959	lb/month
		naphthalene	0.0671	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00327
benzene	78.11	60	0.00349
2,2,4 TMP	114.23	60	0.00388
toluene	92.14	60	0.00362
ethylbenzene	106.17	60	0.00021
xylenes	106.17	60	0.00092
cumene	120.19	60	0.00003
naphthalene	128.17	60	1.20E-06

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.013525	5.935	0.00228
benzene	0.015959	5.935	0.00269
2,2,4 TMP	0.012116	5.935	0.00204
toluene	0.014037	5.935	0.00237
ethylbenzene	0.000713	5.935	0.00012
xylenes	0.003092	5.935	0.00052
cumene	9.91E-05	5.935	0.00002
naphthalene	3.35E-06	5.935	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	1.2141
benzene	6.906	1211	220.79	0.7214
2,2,4 TMP	6.812	1257.8	220.74	0.3604
toluene	7.017	1377.6	222.64	0.1925
ethylbenzene	6.95	1419.3	212.61	0.0564
xylenes	7.009	1462.3	215.11	0.0489
cumene	6.929	1455.8	207.2	0.0248
naphthalene	7.146	1831.6	211.82	0.0011

MONTH April

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**632.56**	lb/month
			0.32	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	103,003.23	barrels/month
Vapor Molecular weight		M_V	**60.15**	
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	1516.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	503.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	512.04	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**513.21**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.230	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.168	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb}v^n)DP^* M_V K_C)/12$ months		L_R	**101.87**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QC_sW_L)/D]*[1+(N_CF_C/D)]$		L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_VK_C$		LF	**443.36**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_VK_C$/12 months		LD	**71.31**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			14.416	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
hexane			2.3548	lb/month
benzene			2.6799	lb/month
2,2,4 TMP			3.3277	lb/month
toluene			3.6943	lb/month
ethylbenzene			0.3815	lb/month
xylenes			1.8049	lb/month
cumene			0.1056	lb/month
naphthalene			0.0675	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00356	
benzene	78.11	60	0.00388	
2,2,4 TMP	114.23	60	0.00436	
toluene	92.14	60	0.00417	
ethylbenzene	106.17	60	0.00026	
xylenes	106.17	60	0.00111	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.62E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.017962	7.230	0.00248	
benzene	0.021597	7.230	0.00299	
2,2,4 TMP	0.016591	7.230	0.00229	
toluene	0.019696	7.230	0.00272	
ethylbenzene	0.001045	7.230	0.00014	
xylenes	0.004541	7.230	0.00063	
cumene	1.49E-04	7.230	0.00002	
naphthalene	5.50E-06	7.230	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	1.6125
benzene	6.906	1211	220.79	0.9762
2,2,4 TMP	6.812	1257.8	220.74	0.4935
toluene	7.017	1377.6	222.64	0.2701
ethylbenzene	6.95	1419.3	212.61	0.0825
xylenes	7.009	1462.3	215.11	0.0717
cumene	6.929	1455.8	207.2	0.0374
naphthalene	7.146	1831.6	211.82	0.0018

MONTH May

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**436.01**	lb/month
			0.22	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	103,003.23	barrels/month
Vapor Molecular weight		M_V	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1760.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**520.10**	°R
Average daily maximum ambient temperature, Table		T_{AX}	527.50	°R
Average daily minimum ambient temperature, Table		T_{AN}	512.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	521.42	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**522.78**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.901	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.101	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb}v^n)DP^* M_V K_C)/12$ months		L_R	**69.40**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QC_sW_L)/D]*[1+(N_CF_C/D)]$		L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_VK_C$		LF	**302.02**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_VK_C$/12 months		LD	**48.58**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			15.787	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
hexane			2.5636	lb/month
benzene			2.9509	lb/month
2,2,4 TMP			3.6635	lb/month
toluene			4.0792	lb/month
ethylbenzene			0.4118	lb/month
xylenes			1.9389	lb/month
cumene			0.1113	lb/month
naphthalene			0.0678	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00572	
benzene	78.11	68	0.00634	
2,2,4 TMP	114.23	68	0.00720	
toluene	92.14	68	0.00704	
ethylbenzene	106.17	68	0.00045	
xylenes	106.17	68	0.00195	
cumene	120.19	68	0.00007	
naphthalene	128.17	68	3.14E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.022129	4.901	0.00452	
benzene	0.027047	4.901	0.00552	
2,2,4 TMP	0.020997	4.901	0.00428	
toluene	0.025471	4.901	0.00520	
ethylbenzene	0.001402	4.901	0.00029	
xylenes	0.006109	4.901	0.00125	
cumene	2.06E-04	4.901	0.00004	
naphthalene	8.16E-06	4.901	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	2.0729
benzene	6.906	1211	220.79	1.2758
2,2,4 TMP	6.812	1257.8	220.74	0.6518
toluene	7.017	1377.6	222.64	0.3644
ethylbenzene	6.95	1419.3	212.61	0.1155
xylenes	7.009	1462.3	215.11	0.1007
cumene	6.929	1455.8	207.2	0.0537
naphthalene	7.146	1831.6	211.82	0.0027

MONTH June

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**549.47**	lb/month
			0.27	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	103,003.23	barrels/month
Vapor Molecular weight		M_V	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1898.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	522.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.27	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**532.74**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.927	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.129	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb}v^n)DP^* M_V K_C)/12$ months		L_R	**88.14**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QC_sW_L)/D]*[1+(N_CF_C/D)]$		L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_VK_C$		LF	**383.61**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_VK_C$/12 months		LD	**61.70**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			20.490	lb/month
Individual HAP Monthly Emissio	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
hexane			3.4010	lb/month
benzene			3.9371	lb/month
TMP			4.8264	lb/month
toluene			5.3065	lb/month
ethylbenzene			0.4994	lb/month
xylenes			2.3240	lb/month
cumene			0.1270	lb/month
naphthalene			0.0686	lb/month
Vapor Weight Concentrations Ec $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00608	
benzene	78.11	68	0.00684	
2,2,4 TMP	114.23	68	0.00785	
toluene	92.14	68	0.00785	
ethylbenzene	106.17	68	0.00052	
xylenes	106.17	68	0.00225	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.01E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.028411	5.927	0.00479	
benzene	0.035291	5.927	0.00595	
2,2,4 TMP	0.027683	5.927	0.00467	
toluene	0.034315	5.927	0.00579	
ethylbenzene	0.001958	5.927	0.00033	
xylenes	0.008557	5.927	0.00144	
cumene	2.95E-04	5.927	0.00005	
naphthalene	1.26E-05	5.927	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	2.6614
benzene	6.906	1211	220.79	1.6646
2,2,4 TMP	6.812	1257.8	220.74	0.8593
toluene	7.017	1377.6	222.64	0.4910
ethylbenzene	6.95	1419.3	212.61	0.1614
xylenes	7.009	1462.3	215.11	0.1411
cumene	6.929	1455.8	207.2	0.0770
naphthalene	7.146	1831.6	211.82	0.0042

MONTH July

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**625.54**	lb/month
		0.31	tons/month
Product Type		**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known)	Q_{month}	**103,003.23**	barrels/month
Vapor Molecular weight	M_v	**68.00**	
Vapor Pressure Equation Constant A	A	11.76	
Vapor Pressure Equation Constant B	B	5315.06	^oR
Daily total solar insolation on a horizontal surface	**I**	1867.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**535.35**	^oR
Average daily maximum ambient temperature, Ta	T_{AX}	542.10	^oR
Average daily minimum ambient temperature, Tal	T_{AN}	528.60	^oR
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	536.75	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**538.20**	^oR
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	6.557	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.147	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**100.71**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**438.31**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**70.50**	lb/month

HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			23.806	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			3.9799	lb/month
benzene			4.6254	lb/month
2,2,4 TMP			5.6434	lb/month
toluene			6.1811	lb/month
ethylbenzene			0.5632	lb/month
xylenes			2.6052	lb/month
cumene			0.1386	lb/month
naphthalene			0.0693	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00627	
benzene	78.11	68	0.00712	
2,2,4 TMP	114.23	68	0.00821	
toluene	92.14	68	0.00830	
ethylbenzene	106.17	68	0.00056	
xylenes	106.17	68	0.00243	
cumene	120.19	68	0.00010	
naphthalene	128.17	68	4.55E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.032424	6.557	0.00494	
benzene	0.040618	6.557	0.00619	
2,2,4 TMP	0.032037	6.557	0.00489	
toluene	0.040170	6.557	0.00613	
ethylbenzene	0.002335	6.557	0.00036	
xylenes	0.010223	6.557	0.00156	
cumene	3.56E-04	6.557	0.00005	
naphthalene	1.58E-05	6.557	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	3.0372
benzene	6.906	1211	220.79	1.9159
2,2,4 TMP	6.812	1257.8	220.74	0.9944
toluene	7.017	1377.6	222.64	0.5747
ethylbenzene	6.95	1419.3	212.61	0.1925
xylenes	7.009	1462.3	215.11	0.1685
cumene	6.929	1455.8	207.2	0.0930
naphthalene	7.146	1831.6	211.82	0.0053

MONTH August

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**609.05**	lb/month
		0.30	tons/month
Product Type		**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known	Q_{month}	**103,003.23**	barrels/month
Vapor Molecular weight	M_v	**68.00**	
Vapor Pressure Equation Constant A	A	11.76	
Vapor Pressure Equation Constant B	B	5315.06	^oR
Daily total solar insolation on a horizontal surface	**I**	1661.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**534.55**	^oR
Average daily maximum ambient tempera	T_{AX}	541.10	^oR
Average daily minimum ambient tempera	T_{AN}	528.00	^oR
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	535.80	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**537.08**	^oR
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	6.424	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.143	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**97.99**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**426.45**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**68.59**	lb/month

HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			23.078	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			3.8534	lb/month
benzene			4.4746	lb/month
2,2,4 TMP			5.4641	lb/month
toluene			5.9884	lb/month
ethylbenzene			0.5491	lb/month
xylenes			2.5429	lb/month
cumene			0.1360	lb/month
naphthalene			0.0691	lb/month
Vapor Weight Concentrations Eq. 40- $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00623	
benzene	78.11	68	0.00706	
2,2,4 TMP	114.23	68	0.00813	
toluene	92.14	68	0.00821	
ethylbenzene	106.17	68	0.00055	
xylenes	106.17	68	0.00240	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.44E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
hexane	0.031568	6.424	0.00491	
benzene	0.039479	6.424	0.00615	
2,2,4 TMP	0.031104	6.424	0.00484	
toluene	0.038910	6.424	0.00606	
ethylbenzene	0.002253	6.424	0.00035	
xylenes	0.009862	6.424	0.00154	
cumene	3.43E-04	6.424	0.00005	
naphthalene	1.51E-05	6.424	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	2.9571
benzene	6.906	1211	220.79	1.8621
2,2,4 TMP	6.812	1257.8	220.74	0.9655
toluene	7.017	1377.6	222.64	0.5567
ethylbenzene	6.95	1419.3	212.61	0.1857
xylenes	7.009	1462.3	215.11	0.1626
cumene	6.929	1455.8	207.2	0.0895
naphthalene	7.146	1831.6	211.82	0.0051

MONTH September

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**1,002.25**	lb/month
		0.50	tons/month
Product Type		**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)	Q_{month}	**103,003.23**	barrels/month
Vapor Molecular weight	M_v	**60.15**	
Vapor Pressure Equation Constant A	A	11.60	
Vapor Pressure Equation Constant B	B	4937.93	^oR
Daily total solar insolation on a horizontal surface	**I**	1328.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**527.95**	^oR
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	534.70	^oR
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	521.20	^oR
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	528.95	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**529.98**	^oR
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	9.802	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.269	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**162.96**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**709.20**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**114.07**	lb/month

HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			24.209	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			4.1516	lb/month
benzene			4.7623	lb/month
2,2,4 TMP			5.7585	lb/month
toluene			6.2083	lb/month
ethylbenzene			0.5554	lb/month
xylenes			2.5677	lb/month
cumene			0.1361	lb/month
naphthalene			0.0690	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00405	
benzene	78.11	60	0.00454	
2,2,4 TMP	114.23	60	0.00519	
toluene	92.14	60	0.00516	
ethylbenzene	106.17	60	0.00034	
xylenes	106.17	60	0.00147	
cumene	120.19	60	0.00006	
naphthalene	128.17	60	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	0.027688	9.802	0.00282	
benzene	0.034242	9.802	0.00349	
2,2,4 TMP	0.026783	9.802	0.00273	
toluene	0.033004	9.802	0.00337	
ethylbenzene	0.001865	9.802	0.00019	
xylenes	0.008143	9.802	0.00083	
cumene	2.79E-04	9.802	0.00003	
naphthalene	1.17E-05	9.802	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	2.4855
benzene	6.906	1211	220.79	1.5478
2,2,4 TMP	6.812	1257.8	220.74	0.7967
toluene	7.017	1377.6	222.64	0.4525
ethylbenzene	6.95	1419.3	212.61	0.1473
xylenes	7.009	1462.3	215.11	0.1287
cumene	6.929	1455.8	207.2	0.0698
naphthalene	7.146	1831.6	211.82	0.0038

MONTH October

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**719.01**	lb/month
			0.36	tons/month
Product Type			**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)		Q_{month}	**103,003.23**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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**	969.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	509.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	517.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**518.13**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.921	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.192	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**116.16**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**505.52**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**81.31**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			16.601	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	2.7623	lb/month
		benzene	3.1483	lb/month
		2,2,4 TMP	3.8714	lb/month
		toluene	4.2499	lb/month
		ethylbenzene	0.4192	lb/month
		xylenes	1.9698	lb/month
		cumene	0.1121	lb/month
		naphthalene	0.0678	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00370	
benzene	78.11	60	0.00407	
2,2,4 TMP	114.23	60	0.00460	
toluene	92.14	60	0.00445	
ethylbenzene	106.17	60	0.00028	
xylenes	106.17	60	0.00121	
cumene	120.19	60	0.00005	
naphthalene	128.17	60	1.86E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.020464	7.921	0.00258	
benzene	0.024816	7.921	0.00313	
2,2,4 TMP	0.019168	7.921	0.00242	
toluene	0.023012	7.921	0.00291	
ethylbenzene	0.001244	7.921	0.00016	
xylenes	0.005416	7.921	0.00068	
cumene	1.80E-04	7.921	0.00002	
naphthalene	6.90E-06	7.921	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	1.8371
benzene	6.906	1211	220.79	1.1217
2,2,4 TMP	6.812	1257.8	220.74	0.5702
toluene	7.017	1377.6	222.64	0.3155
ethylbenzene	6.95	1419.3	212.61	0.0983
xylenes	7.009	1462.3	215.11	0.0856
cumene	6.929	1455.8	207.2	0.0452
naphthalene	7.146	1831.6	211.82	0.0022

MONTH November

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**554.59**	lb/month
			0.28	tons/month
Product Type			**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)		Q_{month}	**103,003.23**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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**	630.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	500.90	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	507.52	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**508.01**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.552	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.147	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**88.99**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**387.28**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**62.29**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			12.524	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	1.9970	lb/month
		benzene	2.2714	lb/month
		2,2,4 TMP	2.8557	lb/month
		toluene	3.2168	lb/month
		ethylbenzene	0.3497	lb/month
		xylenes	1.6657	lb/month
		cumene	0.1001	lb/month
		naphthalene	0.0672	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00341	
benzene	78.11	60	0.00368	
2,2,4 TMP	114.23	60	0.00411	
toluene	92.14	60	0.00389	
ethylbenzene	106.17	60	0.00023	
xylenes	106.17	60	0.00101	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.40E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.015596	6.552	0.00238	
benzene	0.018578	6.552	0.00284	
2,2,4 TMP	0.014188	6.552	0.00217	
toluene	0.016640	6.552	0.00254	
ethylbenzene	0.000864	6.552	0.00013	
xylenes	0.003751	6.552	0.00057	
cumene	1.22E-04	6.552	0.00002	
naphthalene	4.30E-06	6.552	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	1.4001
benzene	6.906	1211	220.79	0.8398
2,2,4 TMP	6.812	1257.8	220.74	0.4221
toluene	7.017	1377.6	222.64	0.2282
ethylbenzene	6.95	1419.3	212.61	0.0683
xylenes	7.009	1462.3	215.11	0.0593
cumene	6.929	1455.8	207.2	0.0305
naphthalene	7.146	1831.6	211.82	0.0014

MONTH December

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		**LT**	**436.94**	lb/month
			0.22	tons/month
Product Type			**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)		Q_{month}	**103,003.23**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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**	513.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	491.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	497.88	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**498.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.419	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		**P***	0.115	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**69.55**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**16.02**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		**LF**	**302.68**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		**LD**	**48.68**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			9.845	lb/month
Individual HAP Monthly Emi:	**Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	1.4800	lb/month
		benzene	1.6875	lb/month
		TMP	2.1858	lb/month
		toluene	2.5492	lb/month
		ethylbenzene	0.3063	lb/month
		xylenes	1.4763	lb/month
		cumene	0.0928	lb/month
		naphthalene	0.0669	lb/month
Vapor Weight Concentratior	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	**M_V**	**Z_{Vi}**	
hexane	86.18	60	0.00314	
benzene	78.11	60	0.00332	
2,2,4 TMP	114.23	60	0.00367	
toluene	92.14	60	0.00339	
ethylbenzene	106.17	60	0.00019	
xylenes	106.17	60	0.00084	
cumene	120.19	60	0.00003	
naphthalene	128.17	60	1.05E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAI}(x_i)$	**P_{VA}**	**y_i**	
hexane	0.011860	5.419	0.00219	
benzene	0.013872	5.419	0.00256	
2,2,4 TMP	0.010474	5.419	0.00193	
toluene	0.012000	5.419	0.00221	
ethylbenzene	0.000598	5.419	0.00011	
xylenes	0.002588	5.419	0.00048	
cumene	8.19E-05	5.419	0.00002	
naphthalene	2.66E-06	5.419	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	1.0647
benzene	6.906	1211	220.79	0.6271
2,2,4 TMP	6.812	1257.8	220.74	0.3116
toluene	7.017	1377.6	222.64	0.1645
ethylbenzene	6.95	1419.3	212.61	0.0472
xylenes	7.009	1462.3	215.11	0.0409
cumene	6.929	1455.8	207.2	0.0205
naphthalene	7.146	1831.6	211.82	0.0009

IFRT TANK EMISSION CALCULATION

INPUT DATA

Input data in Green. Select Cells in Red to open the drop down selection list.

	Symbol		Units
Tank No. 10			
Nearest US Location		New York-Kennedy, NY	
Time Period		Annual	
Absolute Pressure	P_A	14.68	psi
Product Information			
Product Type (annual average, see below for monthly calcs)		Gasoline - RVP 13	
Vapor Molecular weight	M_v	62	Lb/lb-mole
Vapor Pressure Equation Constant A (Figure 7.1-15)	A	11.64	
Vapor Pressure Equation Constant B (Figure 7.1-15)	B	5043.58	^oR
Average organic liquid density	W_L	5.60	lb/gal
Average Reid Vapor Pressure	RVP	13.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Tank design data			
Shell height	Hs	43.83	ft
Diameter	D	125.00	ft
Throughput	Q	304,807,432	gal/yr
Turnovers	N	79.37	per year
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	42.83	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	1.00	ft
Liquid height (assume 1/2 Hs)	H_L	21.92	ft
Tank Construction (pick from drop down list)		Riveted	
Tank Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Internal floating roof design data			
Rim Seal Type:		Vapor-mounted seal | Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)		Average	
Number of fixed roof support columns	Nc	0.00	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columms; 1.0 if	Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	K_D	0.14	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.2	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.0	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	0.0	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.3	NA
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		Bolted	
Select Deck Construction Type		Continuous sheet	
If bolted continuous sheet or panel, enter width		5	
If bolted panel, also enter length			
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft^2

Deck Fitting Data	**Type**	**Qty**	Loss Factor **Kf (Table 7.1-12)**	
Access Hatch	Unbolted cover, ungasketed	1	36.0	
Column Well	Built-up column, gasketed sliding cover	0	33.0	
Unslotted Guidepole/Well	Gasketed sliding cover w/pole sleeve	0	8.6	
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	0	11.0	
Gauge-float well (auto gauge)	Unbolted cover, ungasketed	1	14.0	
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0	
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2	
Deck drain	Stub drain (1-inch diameter)	125	1.2	
Legs (IFR type)	IFR type, Adjustable	44	7.9	
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7	
Ladder	Sliding cover, gasketed	0	56.0	
Ladder/guidepole combination	Ladder sleeve, gasketed sliding cover	0	60.0	
Total deck fitting loss factor Eq. 2-14:			565.80	per year

ROUTINE EMISSIONS CALCULATIONS

	Symbol		Units
Total Losses (Eq.2-1 & 2-2: LT = LR+LW+LF+LD)	**LT**	**12,635.30**	lb/year
		6.32	ton/year
Data based on specific time averaging period			
True Vapor Pressure Eq. 1-25 PvA = exp(A-(B/TLA))	PvA	6.778	psia
Vapor pressure function; P*=PVA/PA/(1+(1-(PVA/PA))^0.5)^2	P*	0.154	
Daily total solar insolation on a horizontal surface	I	**1231.0**	Btu/ft^2-day
Rim Seal Losses (Eq.2-3: LR = (KRa + KRb v^n)DP* Mv Kc)	**LR**	**2,619.29**	lb/year
Zero wind speed LR factor; see Table 7.1-8	K_{Ra}	2.20	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	K_{Rb}	0.00	lb-mole/(mph)nft*yr
Average ambient wind speed at tank site; if IFR use Zero	v	0.00	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.30	NA
Vapor pressure function	P*	0.1536239	NA
Tank diameter	D	125.00	ft
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Withdrawal losses Eq.2-19: $L_{WD}=(0.943*QC_sW_L/D)*[1+(N_cF_c/D)]$	**LW**	**459.89**	lb/yr
Annual throughput	Q	7,257,320	bbl/yr
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft2
Average organic liquid density	W_L	5.60	lb/gal
Tank diameter	D	125.00	ft
Constant	0.943	0.943	1,000 ft3*gal/bbl2
Number of fixed roof support columns	Nc	0.00	NA
Effective column diameter; 1.1, 0.7, or 1.0	Fc	1.10	ft
Deck Fitting Losses (Eq.2-13: LF = FF P*MvKc)	**LF**	**5,389.07**	lb/yr
Total deck fitting loss factor; see Eq. 2-14	FF	565.80	lb-mole/year
Vapor pressure function; see Figure 7.1-19	P*	0.15	
Average vapor molecular weight	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Deck Seam Losses (Eq.2-18: LD = KDSDD2P*MvKc)	**LD**	**4,167.05**	lb/yr
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	0.14	lb-mole/ft-yr
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft2
Tank diameter	D	125.00	ft
Vapor pressure function; see Figure 7.1-19	P*	0.15	NA
Average vapor molecular weight; see Note 1 to Equation 1-21	Mv	62.00	lb/lb-mole
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	NA
Average Daily Ambient Temperature; see Equation 1-30			
TAA = ((TAX+TAN)/2)	**TAA**	**514.00**	^oR
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	^oR
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	^oR
Average Daily Liquid Surface Temperature (TLA) Eq 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	**TLA**	**518.36**	^oR
Average daily ambient temperature (Equation 1-30)	TAA	514.00	^oR
Liquid bulk temperature (Equation 1-31)	TB	516.14	^oR
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	**TB**	516.14	^oR
Average daily ambient temperature (Equation 1-30)	TAA	514.00	
Tank paint solar absorptance, dimensionless, Table 7.1-6	αs	0.58	
Daily total solar insolation on a horizontal surface, Btu/(ft2 day)	I	1231	Btu/(ft2 day)

HAPS Speciation

Product - select from list:				Gasoline	
Total HAP Annual Average Emissions				350.63	
Individual HAP Annual Average Emissi Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$					
				L_{Ti}	
hexane				53.857	lb/yr
benzene				62.439	lb/yr
TMP				79.590	lb/yr
toluene				91.482	lb/yr
ethylbenzene				10.135	lb/yr
xylenes				48.285	lb/yr
cumene				2.906	lb/yr
naphthalene				1.933	lb/yr
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$					
		M_i	M_V	Z_{Vi}	
	hexane	86.18	62	0.00405	
	benzene	78.11	62	0.00445	
	2,2,4 TMP	114.23	62	0.00503	
	toluene	92.14	62	0.00487	
	ethylbenzene	106.17	62	0.00030	
	xylenes	106.17	62	0.00132	
	cumene	120.19	62	0.00005	
	naphthalene	128.17	62	2.04E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$					
		$P_i = P_{VAI}(x_i)$	P_{VA}	y_i	
	hexane	0.019729	6.778	0.00291	
	benzene	0.023933	6.778	0.00353	
	2,2,4 TMP	0.018491	6.778	0.00273	
	toluene	0.022210	6.778	0.00328	
	ethylbenzene	0.001202	6.778	0.00018	
	xylenes	0.005232	6.778	0.00077	
	cumene	1.74E-04	6.778	0.00003	
	naphthalene	6.68E-06	6.778	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	1.8481
	benzene	6.906	1211	220.79	1.1289
	2,2,4 TMP	6.812	1257.8	220.74	0.5740
	toluene	7.017	1377.6	222.64	0.3178
	ethylbenzene	6.95	1419.3	212.61	0.0991
	xylenes	7.009	1462.3	215.11	0.0863
	cumene	6.929	1455.8	207.2	0.0455
	naphthalene	7.146	1831.6	211.82	0.0022

MONTHLY IFRT TANK VOC AND HAP ESTIMATIONS

INPUT DATA	Symbol		Units
Tank No.	10		
Nearest US Location		New York-Kennedy, NY	
Absolute Pressure	P_A	14.68	psi
Product Information			
Average organic liquid density	W_L	5.60	lb/gal
Average Reid Vapor Pressure	RVP	13.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	K_c	1.00	
Tank design data		0	
Shell height	Hs	43.83	ft
Diameter	D	125.00	ft
Throughput	Q	25,400,619	gal/month
Maximum Filling Height (use Hs-1 if unknown)	H_{LX}	42.83	ft
Minimum Filling Height (use 1 if unknown)	H_{LN}	1.00	ft
Liquid height (assume 1/2 Hs)	H_L	21.92	ft
Tank Construction (pick from drop down list)		Riveted	
Tank Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Internal floating roof design data			
Rim Seal Type:	Vapor-mounted seal	Rim-mounted secondary	
Rim Seal Fit (Average or Tight fitting)		Average	
Number of fixed roof support columns	Nc	0.00	NA
Effective column diameter (1.1 for 9x7 in. built up columns; 0.7 for 8 in. pipe columns; 1.0 if	Fc	1.10	ft
Deck seam loss per unit seam length factor; 0.0 or 0.14	KD	0.14	lb-mole/ft-yr
Zero wind speed LR factor; see Table 7.1-8	KRa	2.2	lb-mole/ft-yr
Wind speed dependent LR factor; see Table 7.1-8	KRb	0.0	lb-mole/(mph)^{n}ft*yr
Average ambient wind speed at tank site; for IFR use Zero	v	0.0	mph
Seal-related wind speed exponent; see Table 7.1-8	n	4.3	NA
Shell clingage factor; see Table 7.1-10	Cs	0.0015	bbl/1,000 ft^2
Deck Design Data			
Deck Seam (choose Welded or Bolted)		Bolted	
Select Deck Construction Type		Continuous sheet	
If bolted continuous sheet or panel, enter width		5	
If bolted panel, also enter length		0	
Deck seam length factor; Length of Seam / Area of Deck	SD	0.20	ft/ft^2

Deck Fitting Data		Qty	Loss Factor Kf (Table 7.1-12)
Access Hatch	Unbolted cover, ungasketed	1	36.0
Column Well	Built-up column, gasketed sliding cover	0	33.0
Unslotted Guidepole and Well	Gasketed sliding cover w/pole sleeve	0	8.6
Slotted guidepole/sample well	Gasketed sliding cover, with pole sleeve	0	11.0
Gauge-float well (automatic ga	Unbolted cover, ungasketed	1	14.0
Gauge-hatch/sample port	Slit fabric seal, 10% open area	1	12.0
Vacuum Breaker	Weighted mechanical actuation, gasketed	1	6.2
Deck drain	Stub drain (1-inch diameter)	125	1.2
Legs (IFR type)	IFR type, Adjustable	44	7.9
Rim Vent	Weighted mechanical actuation, gasketed	0	0.7
Ladder	Sliding cover, gasketed	0	56.0
Ladder / Guide-Pole Combinati	Ladder sleeve, gasketed sliding cover	0	60.0
Monthly deck fitting loss factor:	F_F	47.15	per month

MONTH January

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	LT	**714.08**	lb/month
		0.36	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	604,776.65	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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	588.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	486.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	493.87	
Average Daily Liquid Surface Temperature Eq. 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**494.93**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.068	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.105	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**145.37**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	LF	**299.10**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	LD	**231.28**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		18.319	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
	hexane	2.4389	lb/month
	benzene	2.8549	lb/month
	TMP	3.9139	lb/month
	toluene	4.8648	lb/month
	ethylbenzene	0.6599	lb/month
	xylenes	3.2165	lb/month
	cumene	0.2106	lb/month
	naphthalene	0.1597	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00304
benzene	78.11	60	0.00320
2,2,4 TMP	114.23	60	0.00352
toluene	92.14	60	0.00323
ethylbenzene	106.17	60	0.00018
xylenes	106.17	60	0.00079
cumene	120.19	60	0.00003
naphthalene	128.17	60	9.44E-07

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.010759	5.068	0.00212
benzene	0.012503	5.068	0.00247
2,2,4 TMP	0.009402	5.068	0.00186
toluene	0.010683	5.068	0.00211
ethylbenzene	0.000524	5.068	0.00010
xylenes	0.002268	5.068	0.00045
cumene	7.11E-05	5.068	0.00001
naphthalene	2.25E-06	5.068	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	0.9659
benzene	6.906	1211	220.79	0.5652
2,2,4 TMP	6.812	1257.8	220.74	0.2797
toluene	7.017	1377.6	222.64	0.1465
ethylbenzene	6.95	1419.3	212.61	0.0414
xylenes	7.009	1462.3	215.11	0.0358
cumene	6.929	1455.8	207.2	0.0178
naphthalene	7.146	1831.6	211.82	0.0007

MONTH February

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	LT	**755.17**	lb/month
		0.38	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	604,776.65	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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	861.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	487.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	495.75	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**497.30**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.314	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.112	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**154.21**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	LF	**317.29**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	LD	**245.34**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		19.192	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
	hexane	2.6111	lb/month
	benzene	3.0472	lb/month
	TMP	4.1328	lb/month
	toluene	5.0795	lb/month
	ethylbenzene	0.6735	lb/month
	xylenes	3.2756	lb/month
	cumene	0.2128	lb/month
	naphthalene	0.1598	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00311
benzene	78.11	60	0.00329
2,2,4 TMP	114.23	60	0.00363
toluene	92.14	60	0.00334
ethylbenzene	106.17	60	0.00019
xylenes	106.17	60	0.00083
cumene	120.19	60	0.00003
naphthalene	128.17	60	1.02E-06

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.011527	5.314	0.00217
benzene	0.013457	5.314	0.00253
2,2,4 TMP	0.010148	5.314	0.00191
toluene	0.011599	5.314	0.00218
ethylbenzene	0.000575	5.314	0.00011
xylenes	0.002490	5.314	0.00047
cumene	7.85E-05	5.314	0.00001
naphthalene	2.53E-06	5.314	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	1.0348
benzene	6.906	1211	220.79	0.6083
2,2,4 TMP	6.812	1257.8	220.74	0.3019
toluene	7.017	1377.6	222.64	0.1590
ethylbenzene	6.95	1419.3	212.61	0.0454
xylenes	7.009	1462.3	215.11	0.0393
cumene	6.929	1455.8	207.2	0.0197
naphthalene	7.146	1831.6	211.82	0.0008

MONTH March

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	LT	**914.48**	lb/month
		0.46	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	604,776.65	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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	1175.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	494.30	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	503.14	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**505.26**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	6.214	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.137	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**188.49**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	LF	**387.80**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	LD	**299.87**	lb/month
HAPS Speciation			
Product - select from list		Gasoline	
Total HAP Monthly Emissions		22.755	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
		L_{Ti}	
	hexane	3.3027	lb/month
	benzene	3.8259	lb/month
	2,2,4 TMP	5.0245	lb/month
	toluene	5.9643	lb/month
	ethylbenzene	0.7307	lb/month
	xylenes	3.5247	lb/month
	cumene	0.2223	lb/month
	naphthalene	0.1602	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	60	0.00333
benzene	78.11	60	0.00358
2,2,4 TMP	114.23	60	0.00399
toluene	92.14	60	0.00375
ethylbenzene	106.17	60	0.00022
xylenes	106.17	60	0.00096
cumene	120.19	60	0.00004
naphthalene	128.17	60	1.29E-06

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAI}(x_i)$	P_{VA}	y_i
hexane	0.014451	6.214	0.00233
benzene	0.017128	6.214	0.00276
2,2,4 TMP	0.013039	6.214	0.00210
toluene	0.015193	6.214	0.00245
ethylbenzene	0.000780	6.214	0.00013
xylenes	0.003383	6.214	0.00054
cumene	1.09E-04	6.214	0.00002
naphthalene	3.76E-06	6.214	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	1.2973
benzene	6.906	1211	220.79	0.7742
2,2,4 TMP	6.812	1257.8	220.74	0.3879
toluene	7.017	1377.6	222.64	0.2083
ethylbenzene	6.95	1419.3	212.61	0.0616
xylenes	7.009	1462.3	215.11	0.0534
cumene	6.929	1455.8	207.2	0.0273
naphthalene	7.146	1831.6	211.82	0.0012

MONTH April

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,205.35**	lb/month
			0.60	tons/month
Product Type			Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)		Q_{month}	604,776.65	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	1516.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	503.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	513.54	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**516.26**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.653	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.182	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months		L_R	**251.06**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**516.55**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)$/12 months		LD	**399.42**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			29.836	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	4.6400	lb/month
		benzene	5.3534	lb/month
		2,2,4 TMP	6.7901	lb/month
		toluene	7.7521	lb/month
		ethylbenzene	0.8501	lb/month
		xylenes	4.0468	lb/month
		cumene	0.2428	lb/month
		naphthalene	0.1611	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00365	
benzene	78.11	60	0.00400	
2,2,4 TMP	114.23	60	0.00450	
toluene	92.14	60	0.00434	
ethylbenzene	106.17	60	0.00027	
xylenes	106.17	60	0.00117	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	1.76E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.019484	7.653	0.00255	
benzene	0.023551	7.653	0.00308	
2,2,4 TMP	0.018154	7.653	0.00237	
toluene	0.021702	7.653	0.00284	
ethylbenzene	0.001165	7.653	0.00015	
xylenes	0.005068	7.653	0.00066	
cumene	1.68E-04	7.653	0.00002	
naphthalene	6.34E-06	7.653	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	1.7491
benzene	6.906	1211	220.79	1.0646
2,2,4 TMP	6.812	1257.8	220.74	0.5400
toluene	7.017	1377.6	222.64	0.2976
ethylbenzene	6.95	1419.3	212.61	0.0920
xylenes	7.009	1462.3	215.11	0.0801
cumene	6.929	1455.8	207.2	0.0421
naphthalene	7.146	1831.6	211.82	0.0020

MONTH May

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**836.18**	lb/month
			0.42	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	604,776.65	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1760.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**520.10**	°R
Average daily maximum ambient temperature, Table		T_{AX}	527.50	°R
Average daily minimum ambient temperature, Table		T_{AN}	512.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	523.16	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**526.33**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.248	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.110	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months		L_R	**171.64**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**353.15**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)$/12 months		LD	**273.07**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			32.571	lb/month
Individual HAP Monthly Emissions	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	5.0494	lb/month
		benzene	5.8893	lb/month
		2,2,4 TMP	7.4580	lb/month
		toluene	8.5258	lb/month
		ethylbenzene	0.9119	lb/month
		xylenes	4.3205	lb/month
		cumene	0.2546	lb/month
		naphthalene	0.1618	lb/month
Vapor Weight Concentrations Eq. 40-6	**$Z_{Vi} = y_iM_i / M_V$**			
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00585	
benzene	78.11	68	0.00652	
2,2,4 TMP	114.23	68	0.00743	
toluene	92.14	68	0.00732	
ethylbenzene	106.17	68	0.00047	
xylenes	106.17	68	0.00205	
cumene	120.19	68	0.00008	
naphthalene	128.17	68	3.43E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.024217	5.248	0.00461	
benzene	0.029774	5.248	0.00567	
2,2,4 TMP	0.023200	5.248	0.00442	
toluene	0.028364	5.248	0.00540	
ethylbenzene	0.001581	5.248	0.00030	
xylenes	0.006900	5.248	0.00131	
cumene	2.34E-04	5.248	0.00004	
naphthalene	9.55E-06	5.248	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	2.2685
benzene	6.906	1211	220.79	1.4044
2,2,4 TMP	6.812	1257.8	220.74	0.7201
toluene	7.017	1377.6	222.64	0.4058
ethylbenzene	6.95	1419.3	212.61	0.1304
xylenes	7.009	1462.3	215.11	0.1137
cumene	6.929	1455.8	207.2	0.0612
naphthalene	7.146	1831.6	211.82	0.0032

MONTH June

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,060.43**	lb/month
			0.53	tons/month
Product Type			Gasoline - RVP 9	
Monthly Throughput (only change if actual is known)		Q_{month}	604,776.65	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1898.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	522.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	533.15	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**536.57**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.363	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.141	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)$/12 months		L_R	**219.89**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**452.41**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)$/12 months		LD	**349.82**	lb/month
HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			42.104	lb/month
Individual HAP Monthly Emissio	**Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$**			
			L_{Ti}	
		hexane	6.7301	lb/month
		benzene	7.8781	lb/month
		TMP	9.8109	lb/month
		toluene	11.0266	lb/month
		ethylbenzene	1.0923	lb/month
		xylenes	5.1148	lb/month
		cumene	0.2872	lb/month
		naphthalene	0.1635	lb/month
Vapor Weight Concentrations Ec $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00621	
benzene	78.11	68	0.00703	
2,2,4 TMP	114.23	68	0.00810	
toluene	92.14	68	0.00816	
ethylbenzene	106.17	68	0.00054	
xylenes	106.17	68	0.00238	
cumene	120.19	68	0.00009	
naphthalene	128.17	68	4.39E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.031177	6.363	0.00490	
benzene	0.038959	6.363	0.00612	
2,2,4 TMP	0.030678	6.363	0.00482	
toluene	0.038336	6.363	0.00602	
ethylbenzene	0.002216	6.363	0.00035	
xylenes	0.009698	6.363	0.00152	
cumene	3.37E-04	6.363	0.00005	
naphthalene	1.48E-05	6.363	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	2.9205
benzene	6.906	1211	220.79	1.8376
2,2,4 TMP	6.812	1257.8	220.74	0.9523
toluene	7.017	1377.6	222.64	0.5485
ethylbenzene	6.95	1419.3	212.61	0.1827
xylenes	7.009	1462.3	215.11	0.1599
cumene	6.929	1455.8	207.2	0.0879
naphthalene	7.146	1831.6	211.82	0.0050

MONTH July

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,206.47**	lb/month
			0.60	tons/month
Product Type			**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known)		Q_{month}	**604,776.65**	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1867.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**535.35**	°R
Average daily maximum ambient temperature, Ta		T_{AX}	542.10	°R
Average daily minimum ambient temperature, Tal		T_{AN}	528.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	538.60	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**541.96**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	7.022	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.161	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**251.30**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**517.04**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**399.80**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			48.620	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			7.8570	lb/month
benzene			9.2242	lb/month
2,2,4 TMP			11.4136	lb/month
toluene			12.7538	lb/month
ethylbenzene			1.2197	lb/month
xylenes			5.6767	lb/month
cumene			0.3106	lb/month
naphthalene			0.1648	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00640	
benzene	78.11	68	0.00731	
2,2,4 TMP	114.23	68	0.00846	
toluene	92.14	68	0.00862	
ethylbenzene	106.17	68	0.00058	
xylenes	106.17	68	0.00256	
cumene	120.19	68	0.00010	
naphthalene	128.17	68	4.96E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.035449	7.022	0.00505	
benzene	0.044662	7.022	0.00636	
2,2,4 TMP	0.035357	7.022	0.00504	
toluene	0.044679	7.022	0.00636	
ethylbenzene	0.002630	7.022	0.00037	
xylenes	0.011527	7.022	0.00164	
cumene	4.05E-04	7.022	0.00006	
naphthalene	1.85E-05	7.022	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 $P_{VAi}=(0.019337)10\text{^}(A-(B/(TLA+C)))$				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	3.3207
benzene	6.906	1211	220.79	2.1066
2,2,4 TMP	6.812	1257.8	220.74	1.0975
toluene	7.017	1377.6	222.64	0.6392
ethylbenzene	6.95	1419.3	212.61	0.2168
xylenes	7.009	1462.3	215.11	0.1900
cumene	6.929	1455.8	207.2	0.1057
naphthalene	7.146	1831.6	211.82	0.0062

MONTH August

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,162.72**	lb/month
			0.58	tons/month
Product Type			**Gasoline - RVP 9**	
Monthly Throughput (only change if actual is known		Q_{month}	**604,776.65**	barrels/month
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant B		B	5315.06	°R
Daily total solar insolation on a horizontal surface		I	1661.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**534.55**	°R
Average daily maximum ambient tempera		T_{AX}	541.10	°R
Average daily minimum ambient tempera		T_{AN}	528.00	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	537.44	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**540.43**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.830	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.155	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**241.89**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**497.68**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**384.83**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			46.646	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			7.5171	lb/month
benzene			8.8174	lb/month
2,2,4 TMP			10.9285	lb/month
toluene			12.2293	lb/month
ethylbenzene			1.1808	lb/month
xylenes			5.5052	lb/month
cumene			0.3034	lb/month
naphthalene			0.1644	lb/month
Vapor Weight Concentrations Eq. 40- $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00634	
benzene	78.11	68	0.00723	
2,2,4 TMP	114.23	68	0.00836	
toluene	92.14	68	0.00849	
ethylbenzene	106.17	68	0.00057	
xylenes	106.17	68	0.00251	
cumene	120.19	68	0.00010	
naphthalene	128.17	68	4.79E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.034192	6.830	0.00501	
benzene	0.042979	6.830	0.00629	
2,2,4 TMP	0.033974	6.830	0.00497	
toluene	0.042796	6.830	0.00627	
ethylbenzene	0.002507	6.830	0.00037	
xylenes	0.010981	6.830	0.00161	
cumene	3.84E-04	6.830	0.00006	
naphthalene	1.74E-05	6.830	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 $P_{VAi}=(0.019337)10\text{^}(A-(B/(TLA+C)))$				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	3.2029
benzene	6.906	1211	220.79	2.0272
2,2,4 TMP	6.812	1257.8	220.74	1.0546
toluene	7.017	1377.6	222.64	0.6123
ethylbenzene	6.95	1419.3	212.61	0.2066
xylenes	7.009	1462.3	215.11	0.1810
cumene	6.929	1455.8	207.2	0.1004
naphthalene	7.146	1831.6	211.82	0.0058

MONTH September

ROUTINE EMISSIONS CALCULATIONS		Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)		LT	**1,909.16**	lb/month
			0.95	tons/month
Product Type			**Gasoline - RVP 15**	
Monthly Throughput (only change if actual is known)		Q_{month}	**604,776.65**	barrels/month
Vapor Molecular weight		M_v	**60.15**	
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	1328.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7		T_{AX}	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7		T_{AN}	521.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	530.26	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I		T_{LA}	**532.65**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	10.271	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.292	NA
Rim Seal Losses Eq. 2-3:				
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months		L_R	**402.47**	lb/month
Withdrawal losses Eq. 2-19:				
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$		L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:				
$L_F = F_F P^*M_vK_c)$		LF	**828.07**	lb/month
Deck Seam Losses Eq. 2-18:				
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months		LD	**640.30**	lb/month
HAPS Speciation				
Product - select from list			Gasoline	
Total HAP Monthly Emissions			48.827	lb/month
Individual HAP Monthly Emissions Eq. 40-2 $L_{Ti} = Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$				
			L_{Ti}	
hexane			8.1016	lb/month
benzene			9.3783	lb/month
2,2,4 TMP			11.4989	lb/month
toluene			12.6454	lb/month
ethylbenzene			1.1912	lb/month
xylenes			5.5443	lb/month
cumene			0.3031	lb/month
naphthalene			0.1641	lb/month
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00413	
benzene	78.11	60	0.00464	
2,2,4 TMP	114.23	60	0.00533	
toluene	92.14	60	0.00533	
ethylbenzene	106.17	60	0.00035	
xylenes	106.17	60	0.00153	
cumene	120.19	60	0.00006	
naphthalene	128.17	60	2.72E-06	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.029576	10.271	0.00288	
benzene	0.036733	10.271	0.00358	
2,2,4 TMP	0.028811	10.271	0.00281	
toluene	0.035707	10.271	0.00348	
ethylbenzene	0.002036	10.271	0.00020	
xylenes	0.008901	10.271	0.00087	
cumene	3.06E-04	10.271	0.00003	
naphthalene	1.31E-05	10.271	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 $P_{VAi}=(0.019337)10\text{^}(A-(B/(TLA+C)))$				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.6551
benzene	6.906	1211	220.79	1.6604
2,2,4 TMP	6.812	1257.8	220.74	0.8571
toluene	7.017	1377.6	222.64	0.4896
ethylbenzene	6.95	1419.3	212.61	0.1609
xylenes	7.009	1462.3	215.11	0.1406
cumene	6.929	1455.8	207.2	0.0767
naphthalene	7.146	1831.6	211.82	0.0042

MONTH October

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**1,332.57**	lb/month
		0.67	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	604,776.65	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	969.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	509.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	518.34	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**520.08**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	8.209	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.202	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**278.43**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**572.86**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**442.96**	lb/month

HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			33.112	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	5.2470	lb/month
		benzene	6.0535	lb/month
		2,2,4 TMP	7.6045	lb/month
		toluene	8.5881	lb/month
		ethylbenzene	0.9072	lb/month
		xylenes	4.2970	lb/month
		cumene	0.2528	lb/month
		naphthalene	0.1616	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_v$				
	M_i	M_v	Z_{Vi}	
hexane	86.18	60	0.00376	
benzene	78.11	60	0.00414	
2,2,4 TMP	114.23	60	0.00469	
toluene	92.14	60	0.00456	
ethylbenzene	106.17	60	0.00029	
xylenes	106.17	60	0.00125	
cumene	120.19	60	0.00005	
naphthalene	128.17	60	1.96E-06	

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.021533	8.209	0.00262	
benzene	0.026199	8.209	0.00319	
2,2,4 TMP	0.020279	8.209	0.00247	
toluene	0.024453	8.209	0.00298	
ethylbenzene	0.001332	8.209	0.00016	
xylenes	0.005801	8.209	0.00071	
cumene	1.94E-04	8.209	0.00002	
naphthalene	7.54E-06	8.209	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	1.9330
benzene	6.906	1211	220.79	1.1843
2,2,4 TMP	6.812	1257.8	220.74	0.6033
toluene	7.017	1377.6	222.64	0.3353
ethylbenzene	6.95	1419.3	212.61	0.1052
xylenes	7.009	1462.3	215.11	0.0917
cumene	6.929	1455.8	207.2	0.0486
naphthalene	7.146	1831.6	211.82	0.0024

MONTH November

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**1,009.68**	lb/month
		0.50	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	604,776.65	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	630.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	500.90	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	508.15	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**509.28**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	6.712	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.152	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**208.97**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**429.94**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**332.45**	lb/month

HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			25.001	lb/month
Individual HAP Monthly Emissions	Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	3.7312	lb/month
		benzene	4.3128	lb/month
		2,2,4 TMP	5.5852	lb/month
		toluene	6.5277	lb/month
		ethylbenzene	0.7678	lb/month
		xylenes	3.6869	lb/month
		cumene	0.2287	lb/month
		naphthalene	0.1605	lb/month

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_v$				
	M_i	M_v	Z_{Vi}	
hexane	86.18	60	0.00345	
benzene	78.11	60	0.00373	
2,2,4 TMP	114.23	60	0.00417	
toluene	92.14	60	0.00396	
ethylbenzene	106.17	60	0.00024	
xylenes	106.17	60	0.00103	
cumene	120.19	60	0.00004	
naphthalene	128.17	60	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	0.016148	6.712	0.00241	
benzene	0.019279	6.712	0.00287	
2,2,4 TMP	0.014745	6.712	0.00220	
toluene	0.017345	6.712	0.00258	
ethylbenzene	0.000905	6.712	0.00013	
xylenes	0.003931	6.712	0.00059	
cumene	1.28E-04	6.712	0.00002	
naphthalene	4.57E-06	6.712	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	1.4496
benzene	6.906	1211	220.79	0.8715
2,2,4 TMP	6.812	1257.8	220.74	0.4386
toluene	7.017	1377.6	222.64	0.2378
ethylbenzene	6.95	1419.3	212.61	0.0715
xylenes	7.009	1462.3	215.11	0.0621
cumene	6.929	1455.8	207.2	0.0321
naphthalene	7.146	1831.6	211.82	0.0015

MONTH December

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total VOC Losses (Eq.2-1 & 2-2: $L_T = L_R+L_W+L_F+L_D$)	**LT**	**792.34**	lb/month
		0.40	tons/month
Product Type		Gasoline - RVP 15	
Monthly Throughput (only change if actual is known)	Q_{month}	604,776.65	barrels/month
Vapor Molecular weight	M_v	**60.15**	
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**	513.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	T_{AX}	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	T_{AN}	491.70	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	498.39	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	**499.31**	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.532	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	**P***	0.118	NA
Rim Seal Losses Eq. 2-3:			
$L_R = ((K_{Ra} + K_{Rb} v^n)DP^* M_v K_c)/12$ months	L_R	**162.21**	lb/month
Withdrawal losses Eq. 2-19:			
$L_W=[((0.943)QCsW_L)/D]*[1+(N_cF_c/D)]$	L_W	**38.32**	lb/month
Deck Fitting Losses Eq.2-13:			
$L_F = F_F P^*M_vK_c)$	**LF**	**333.74**	lb/month
Deck Seam Losses Eq. 2-18:			
$L_D = K_DS_DD^2P^*M_vK_c)/12$ months	**LD**	**258.06**	lb/month

HAPS Speciation				
	Product - select from list		Gasoline	
Total HAP Monthly Emissions			19.999	lb/month
Individual HAP Monthly Emi:	Eq. 40-2 $L_{Ti} =Z_{Vi}(L_R + L_F + L_D) + Z_{Li}L_W$			
			L_{Ti}	
		hexane	2.7693	lb/month
		benzene	3.2244	lb/month
		TMP	4.3350	lb/month
		toluene	5.2788	lb/month
		ethylbenzene	0.6862	lb/month
		xylenes	3.3310	lb/month
		cumene	0.2149	lb/month
		naphthalene	0.1599	lb/month

Vapor Weight Concentratior $Z_{Vi} = y_iM_i / M_v$				
	M_i	M_v	Z_{Vi}	
hexane	86.18	60	0.00316	
benzene	78.11	60	0.00336	
2,2,4 TMP	114.23	60	0.00372	
toluene	92.14	60	0.00344	
ethylbenzene	106.17	60	0.00020	
xylenes	106.17	60	0.00086	
cumene	120.19	60	0.00003	
naphthalene	128.17	60	1.08E-06	

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.012217	5.532	0.00221	
benzene	0.014318	5.532	0.00259	
2,2,4 TMP	0.010824	5.532	0.00196	
toluene	0.012433	5.532	0.00225	
ethylbenzene	0.000622	5.532	0.00011	
xylenes	0.002694	5.532	0.00049	
cumene	8.55E-05	5.532	0.00002	
naphthalene	2.80E-06	5.532	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	1.0967
benzene	6.906	1211	220.79	0.6472
2,2,4 TMP	6.812	1257.8	220.74	0.3220
toluene	7.017	1377.6	222.64	0.1705
ethylbenzene	6.95	1419.3	212.61	0.0492
xylenes	7.009	1462.3	215.11	0.0426
cumene	6.929	1455.8	207.2	0.0214
naphthalene	7.146	1831.6	211.82	0.0009

FRT TANK EMISSION CALCULATION

Tank No.	1		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**107.37**	lb/year
		0.05	ton/year
Time Period		**Annual**	
Nearest US Location		lew York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	^oR
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**5,384,158**	gal/yr
Turnovers	N	**45.82**	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.006309848	
Partially Insulated	P_{VA}	0.006354705	
Fully Insulated	P_{VA}	0.005765399	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	^oR
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	^oR
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	^oR
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	516.14	^oR
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.86**	^oR
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**519.07**	^oR
Fully Insulated: TLA = TB	**TLA**	**516.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**521.07**	**^oR**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**522.00**	**^oR**
Fully Insulated; Tv = TB	**Tv**	**516.14**	**^oR**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.467E-04	
Partially Insulated	Wv	1.475E-04	
Fully Insulated	Wv	1.353E-04	

Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**20.64**	lb/yr
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**86.73**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	719,682	ft3/yr
Working Loss Turnover Factor	KN	0.8215	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0063	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0458**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.66	^oR
Average Daily Vapor Pressure Range	ΔPv	0.0025	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0063	psia
Average Daily Liquid Surface Temperature	TLA	518.86	^oR
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	^oR
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.66**	**^oR**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**22.32**	^oR
Fully Insulated, constant temperature	**ΔTv**	**0.00**	^oR
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00248**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00766	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00518	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	524.77	^oR
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.94	^oR
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00235**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00763	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0052737	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	524.65	^oR
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	513.49	^oR
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/yr**						
Product	Diesel						
Total HAP Emissions =	**9.443**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0461	86.18	130	0.00043	0.000004	0.006	**0.00065**
benzene	0.2254	78.11	130	0.00210	0.000022	0.006	**0.00349**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	2.5417	92.14	130	0.02367	0.000211	0.006	**0.03340**
ethylbenzene	0.3225	106.17	130	0.00300	0.000023	0.006	**0.00368**
xylenes	6.2650	106.17	130	0.05835	0.000451	0.006	**0.07145**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0427	128.17	130	3.98E-04	2.55E-06	0.006	**4.04E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.8724
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1447
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5823
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3228
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1008
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0878
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0464
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0023

Monthly Calculations - JANUARY

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.94**	lb/month
		1.97E-03	ton/month
Time Period		**January**	
Nearest US Location		**lew York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Distillate Fuel Oil No.2**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**44.95**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0027759	
Partially Insulated	P_{VA}	0.0027862	
Fully Insulated	P_{VA}	0.0026479	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.87	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.17**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.27**	°R
Fully Insulated: TLA = TB	**TLA**	**493.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.23**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.67**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.87**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.777E-05	
Partially Insulated	Wv	6.796E-05	
Fully Insulated	Wv	6.495E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.55**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.39**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0309**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.29	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Average Daily Liquid Surface Temperature	TLA	495.17	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.29**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.08**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00077**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00319	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00241	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	498.99	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.35	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00071**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00316	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0024496	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.336**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0020	86.18	130	0.00051	0.000002	0.003	**0.00076**
benzene	0.0093	78.11	130	0.00237	0.000011	0.003	**0.00395**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	-
toluene	0.0970	92.14	130	0.02462	0.000096	0.003	**0.03474**
ethylbenzene	0.0112	106.17	130	0.00283	0.000010	0.003	**0.00347**
xylenes	0.2152	106.17	130	0.05465	0.000186	0.003	**0.06691**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0011	128.17	130	2.88E-04	8.11E-07	0.003	**2.92E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9726
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5694
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2819
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1477
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0418
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0362
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0180
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) **FEBRUARY**

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.07**	lb/month
		2.03E-03	ton/month
Time Period		**February**	
Nearest US Location		**lew York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Distillate Fuel Oil No.2**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**49.77**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0030358	
Partially Insulated	P_{VA}	0.0030522	
Fully Insulated	P_{VA}	0.0028348	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	495.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**497.65**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**497.80**	°R
Fully Insulated: TLA = TB	**TLA**	**495.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**499.19**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**499.84**	**°R**
Fully Insulated; Tv = TB	**Tv**	**495.75**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.367E-05	
Partially Insulated	Wv	7.398E-05	
Fully Insulated	Wv	6.927E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.67**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.038	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.40**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7694	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0030	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0383**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.02	°R
Average Daily Vapor Pressure Range	ΔPv	0.0010	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0030	psia
Average Daily Liquid Surface Temperature	TLA	497.65	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.02**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.73**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00104**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00360	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00255	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	502.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.89	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00098**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00357	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0025990	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	502.23	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.348**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0020	86.18	130	0.00050	0.000002	0.003	**0.00075**
benzene	0.0095	78.11	130	0.00234	0.000012	0.003	**0.00390**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	-
toluene	0.0998	92.14	130	0.02454	0.000105	0.003	**0.03462**
ethylbenzene	0.0116	106.17	130	0.00285	0.000011	0.003	**0.00349**
xylenes	0.2241	106.17	130	0.05510	0.000205	0.003	**0.06746**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0012	128.17	130	2.99E-04	9.21E-07	0.003	**3.03E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.0453
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6149
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3053
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1610
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0461
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0399
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0200
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) MARCH

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.98**	lb/month
		2.99E-03	ton/month
Time Period		**March**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**44.95**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.004042	
Partially Insulated	P_{VA}	0.0040709	
Fully Insulated	P_{VA}	0.0036917	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	503.14	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**505.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**505.94**	°R
Fully Insulated: TLA = TB	**TLA**	**503.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**507.85**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**508.73**	**°R**
Fully Insulated; Tv = TB	**Tv**	**503.14**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.642E-05	
Partially Insulated	Wv	9.694E-05	
Fully Insulated	Wv	8.889E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.16**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**4.82**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0040	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0459**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.15	°R
Average Daily Vapor Pressure Range	ΔPv	0.0016	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0040	psia
Average Daily Liquid Surface Temperature	TLA	505.73	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**21.79**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00164**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00493	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00330	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.52	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.95	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00155**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00491	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0033610	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	511.39	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	500.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.518**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0028	86.18	130	0.00047	0.000003	0.004	**0.00071**
benzene	0.0134	78.11	130	0.00225	0.000015	0.004	**0.00374**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	**-**
toluene	0.1449	92.14	130	0.02423	0.000138	0.004	**0.03419**
ethylbenzene	0.0174	106.17	130	0.00292	0.000014	0.004	**0.00357**
xylenes	0.3377	106.17	130	0.05646	0.000279	0.004	**0.06913**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	**0.00E+00**
naphthalene	0.0020	128.17	130	3.35E-04	1.37E-06	0.004	**3.40E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.3146
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7852
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3936
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2116
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0627
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0544
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0278
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0012

Monthly Calculations (continued) APRIL

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**8.59**	lb/month
		4.30E-03	ton/month
Time Period		**April**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**46.45**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0059091	
Partially Insulated	P_{VA}	0.0059612	
Fully Insulated	P_{VA}	0.0052823	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	513.54	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**516.88**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**517.14**	°R
Fully Insulated: TLA = TB	**TLA**	**513.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.60**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**520.75**	**°R**
Fully Insulated; Tv = TB	**Tv**	**513.54**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.378E-04	
Partially Insulated	Wv	1.387E-04	
Fully Insulated	Wv	1.246E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.88**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.054	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**6.71**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8125	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0059	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0540**	**per day**
Average Daily Vapor Temperature Range	ΔTv	27.81	°R
Average Daily Vapor Pressure Range	ΔPv	0.0028	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0059	psia
Average Daily Liquid Surface Temperature	TLA	516.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**27.81**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.35**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00276**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00743	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00467	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	523.83	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00263**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00740	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0047735	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	523.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	510.56	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.754**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0037	86.18	130	0.00044	0.000004	0.006	**0.00066**
benzene	0.0182	78.11	130	0.00212	0.000021	0.006	**0.00353**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	0.2042	92.14	130	0.02376	0.000198	0.006	**0.03352**
ethylbenzene	0.0257	106.17	130	0.00299	0.000022	0.006	**0.00366**
xylenes	0.4992	106.17	130	0.05809	0.000420	0.006	**0.07113**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0033	128.17	130	3.88E-04	2.33E-06	0.006	**3.94E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.7777
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.0832
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5498
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3034
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0940
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0818
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0431
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0021

Monthly Calculations (continued) — MAY

Tank No. 1

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	12.29	lb/month
		6.15E-03	ton/month
Time Period		May	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1760.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	34.00	ft
Diameter	D	25.00	ft
Throughput	Q	448,680	gal/month
Turnovers	N	44.95	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	33.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	17.00	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.008238	
Partially Insulated	P_{VA}	0.0083192	
Fully Insulated	P_{VA}	0.0072678	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	520.10	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	523.16	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	527.04	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	527.35	°R
Fully Insulated: TLA = TB	TLA	523.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	530.21	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	531.53	°R
Fully Insulated; Tv = TB	Tv	523.16	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.882E-04	
Partially Insulated	Wv	1.896E-04	
Fully Insulated	Wv	1.683E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	2.88	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.059	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	9.41	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0082	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0587	per day
Average Daily Vapor Temperature Range	ΔTv	30.78	°R
Average Daily Vapor Pressure Range	ΔPv	0.0041	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0082	psia
Average Daily Liquid Surface Temperature	TLA	527.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	30.78	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	29.30	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00409	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01051	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00641	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	519.35	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00393	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01048	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0065580	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	534.67	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.02	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	8,472.69	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	17.26	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.26	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	1.71	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	1.088	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0050	86.18	130	0.00041	0.000005	0.008	0.00061
benzene	0.0247	78.11	130	0.00201	0.000028	0.008	0.00335
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.008	-
toluene	0.2863	92.14	130	0.02329	0.000271	0.008	0.03286
ethylbenzene	0.0375	106.17	130	0.00305	0.000031	0.008	0.00373
xylenes	0.7294	106.17	130	0.05933	0.000598	0.008	0.07265
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.008	0.00E+00
naphthalene	0.0054	128.17	130	4.39E-04	3.67E-06	0.008	4.46E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.3098
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.4315
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.7346
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4146
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1335
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1165
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0628
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0033

Monthly Calculations (continued) — JUNE

Tank No. 1

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	16.26	lb/month
		8.13E-03	ton/month
Time Period		June	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1898.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	34.00	ft
Diameter	D	25.00	ft
Throughput	Q	448,680	gal/month
Turnovers	N	46.45	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	33.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	17.00	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0113876	
Partially Insulated	P_{VA}	0.0115041	
Fully Insulated	P_{VA}	0.0099988	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	529.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.15	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	537.34	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	537.67	°R
Fully Insulated: TLA = TB	TLA	533.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	540.75	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	542.18	°R
Fully Insulated; Tv = TB	Tv	533.15	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.551E-04	
Partially Insulated	Wv	2.570E-04	
Fully Insulated	Wv	2.272E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	3.83	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.060	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	12.43	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8125	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0597	per day
Average Daily Vapor Temperature Range	ΔTv	31.89	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Average Daily Liquid Surface Temperature	TLA	537.34	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	31.89	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	30.48	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00564	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01451	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00887	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	545.31	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.36	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00543	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01450	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0090664	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	545.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.05	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	8,472.69	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	17.26	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.26	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	1.71	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	1.448	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0061	86.18	130	0.00038	0.000006	0.011	0.00057
benzene	0.0310	78.11	130	0.00190	0.000036	0.011	0.00317
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.011	-
toluene	0.3706	92.14	130	0.02279	0.000366	0.011	0.03215
ethylbenzene	0.0503	106.17	130	0.00309	0.000043	0.011	0.00379
xylenes	0.9819	106.17	130	0.06037	0.000842	0.011	0.07392
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.011	0.00E+00
naphthalene	0.0080	128.17	130	4.93E-04	5.69E-06	0.011	5.00E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.9751
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8742
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9720
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5608
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1873
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1639
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0903
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) JULY

Tank No.	1						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	4.46	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	LT	19.35	lb/month	Vapor Space Volume	Vv	8472.7	ft3
		9.68E-03	ton/month	Stock Vapor Density	Wv	0.0003	lb/ft3
Time Period		July		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.058	per day
Nearest US Location	lew York-Kennedy, NY			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1867.0	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	14.89	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Product Type	Distillate Fuel Oil No.2			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Vapor Molecular weight	Mv	130	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	7.10	lb/gal	Stock Vapor Density	Wv	0.0003	lb/ft3
Average Reid Vapor Pressure	RVP	0.02		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00					
Vapor Pressure Equation Constant A	A	12.10		Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
				Vapor Space Outage	Hvo	17.26	ft
Tank design data							
Shell height	Hs	34.00	ft	Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0578	per day
Diameter	D	25.00	ft	Average Daily Vapor Temperature Range	ΔTv	31.11	°R
Throughput	Q	448,680	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0064	psi
Turnovers	N	44.95	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Roof Type:		Cone		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft	Average Daily Liquid Surface Temperature	TLA	542.71	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height (use Hs-1 if unknown)	HLX	33.00	ft				
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft	Average Daily Vapor Temperature Range (ΔTv)			
Liquid height (assume 1/2 Hs)	HL	17.00	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Tank Insulation (pick from drop down list)		Not Insulated		Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	31.11	°R
Tank Construction (pick from drop down list)		Riveted		Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	29.76	°R
Tank Shell Color (pick from drop down list)		Gray, light		Fully Insulated, constant temperature	ΔTv	0.00	°R
Tank Shell Condition (pick from drop down list)		Average					
Tank Interior Condition (pick from drop down list)		Light Rust		Average Daily Vapor Pressure Range (ΔPv)			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58		Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00635	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01692	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp	PVN	0.01057	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	550.49	°R
Not Insulated	P_{VA}	0.0134204		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	534.94	°R
Partially Insulated	P_{VA}	0.0135529					
Fully Insulated	P_{VA}	0.0118389		Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00612	psia
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01692	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	535.35	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0107917	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	550.48	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	535.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	538.60	°R	Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Average Daily Liquid Surface Temperature (TLA)				Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	8,472.69	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	542.71	°R	Tank diameter	D	25.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	543.04	°R	Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Fully Insulated: TLA = TB	TLA	538.6					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	17.26	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	34.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	546.07	°R	Liquid Height	HL	17.00	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	547.48	°R	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Fully Insulated; Tv = TB	Tv	538.60	°R				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.26	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	2.977E-04		Tank shell radius	Rs	12.50	ft
Partially Insulated	Wv	2.999E-04					
Fully Insulated	Wv	2.663E-04		Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	1.71	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
				Tank shell radius	Rs	12.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	1.726	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0070	86.18	130	0.00036	0.000007	0.013	0.00055
benzene	0.0358	78.11	130	0.00185	0.000041	0.013	0.00308
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.013	-
toluene	0.4358	92.14	130	0.02252	0.000426	0.013	0.03177
ethylbenzene	0.0602	106.17	130	0.00311	0.000051	0.013	0.00381
xylenes	1.1772	106.17	130	0.06083	0.001000	0.013	0.07448
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.013	0.00E+00
naphthalene	0.0101	128.17	130	5.22E-04	7.10E-06	0.013	5.29E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.3803
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	2.1469
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.1193
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.6530
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.2220
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1946
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.1084
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0064

Monthly Calculations (continued) AUGUST

Tank No.	1						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	3.91	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	LT	18.14	lb/month	Vapor Space Volume	Vv	8472.7	ft3
		9.07E-03	ton/month	Stock Vapor Density	Wv	0.0003	lb/ft3
Time Period		August		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.053	per day
Nearest US Location	lew York-Kennedy, NY			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1661.0	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	14.23	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Product Type	Distillate Fuel Oil No.2			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Vapor Molecular weight	Mv	130	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	7.10	lb/gal	Stock Vapor Density	Wv	0.0003	lb/ft3
Average Reid Vapor Pressure	RVP	0.02		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00					
Vapor Pressure Equation Constant A	A	12.10		Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0128	psia
				Vapor Space Outage	Hvo	17.26	ft
Tank design data							
Shell height	Hs	34.00	ft	Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0529	per day
Diameter	D	25.00	ft	Average Daily Vapor Temperature Range	ΔTv	28.44	°R
Throughput	Q	448,680	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0056	psi
Turnovers	N	44.95	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Roof Type:		Cone		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0128	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft	Average Daily Liquid Surface Temperature	TLA	541.10	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height (use Hs-1 if unknown)	HLX	33.00	ft				
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft	Average Daily Vapor Temperature Range (ΔTv)			
Liquid height (assume 1/2 Hs)	HL	17.00	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Tank Insulation (pick from drop down list)		Not Insulated		Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	28.44	°R
Tank Construction (pick from drop down list)		Riveted		Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	27.13	°R
Tank Shell Color (pick from drop down list)		Gray, light		Fully Insulated, constant temperature	ΔTv	0.00	°R
Tank Shell Condition (pick from drop down list)		Average					
Tank Interior Condition (pick from drop down list)		Light Rust		Average Daily Vapor Pressure Range (ΔPv)			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58		Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00556	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01582	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp	PVN	0.01026	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	548.21	°R
Not Insulated	P_{VA}	0.0127799		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.99	°R
Partially Insulated	P_{VA}	0.0128927					
Fully Insulated	P_{VA}	0.0114243		Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00534	psia
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01580	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	534.55	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0104641	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	548.17	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	534.61	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	537.44	°R	Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Average Daily Liquid Surface Temperature (TLA)				Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	8,472.69	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	541.10	°R	Tank diameter	D	25.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	541.39	°R	Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Fully Insulated: TLA = TB	TLA	537.4					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	17.26	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	34.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	544.09	°R	Liquid Height	HL	17.00	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	545.34	°R	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Fully Insulated; Tv = TB	Tv	537.44	°R				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.26	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	2.846E-04		Tank shell radius	Rs	12.50	ft
Partially Insulated	Wv	2.864E-04					
Fully Insulated	Wv	2.575E-04		Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	1.71	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
				Tank shell radius	Rs	12.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	1.617	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0067	86.18	130	0.00037	0.000007	0.013	0.00056
benzene	0.0339	78.11	130	0.00187	0.000040	0.013	0.00311
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.013	-
toluene	0.4100	92.14	130	0.02260	0.000407	0.013	0.03188
ethylbenzene	0.0563	106.17	130	0.00310	0.000049	0.013	0.00380
xylenes	1.1012	106.17	130	0.06070	0.000950	0.013	0.07432
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.013	0.00E+00
naphthalene	0.0093	128.17	130	5.13E-04	6.65E-06	0.013	5.21E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.2544
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	2.0619
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0733
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.6241
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.2111
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1850
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.1027
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0060

Monthly Calculations (continued) SEPTEMBER

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**13.71**	lb/month
		6.85E-03	ton/month
Time Period		**September**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**46.45**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0100098	
Partially Insulated	P_{VA}	0.0100825	
Fully Insulated	P_{VA}	0.0091281	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.26	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.19**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.42**	°R
Fully Insulated: TLA = TB	**TLA**	**530.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**535.58**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**536.58**	**°R**
Fully Insulated; Tv = TB	**Tv**	**530.26**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.264E-04	
Partially Insulated	Wv	2.276E-04	
Fully Insulated	Wv	2.085E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.67**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**11.03**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8125	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0469**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.85	°R
Average Daily Vapor Pressure Range	ΔPv	0.0039	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Average Daily Liquid Surface Temperature	TLA	533.19	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.85**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.50**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00391**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01213	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00822	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	539.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.97	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00372**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01209	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0083713	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	539.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	527.54	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Product	Diesel	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Total HAP Emissions =	**1.218**						
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0053	86.18	130	0.00039	0.000006	0.010	**0.00059**
benzene	0.0267	78.11	130	0.00195	0.000032	0.010	**0.00324**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.010	**-**
toluene	0.3152	92.14	130	0.02299	0.000325	0.010	**0.03244**
ethylbenzene	0.0421	106.17	130	0.00308	0.000038	0.010	**0.00377**
xylenes	0.8221	106.17	130	0.05998	0.000735	0.010	**0.07344**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.010	**0.00E+00**
naphthalene	0.0065	128.17	130	4.71E-04	4.78E-06	0.010	**4.78E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.6904
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.6840
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8697
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4974
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1637
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1432
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0782
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) OCTOBER

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**9.34**	lb/month
		4.67E-03	ton/month
Time Period		**October**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**44.95**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0066554	
Partially Insulated	P_{VA}	0.0066924	
Fully Insulated	P_{VA}	0.0062023	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	518.34	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.47**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**520.64**	°R
Fully Insulated: TLA = TB	**TLA**	**518.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**522.21**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**522.94**	**°R**
Fully Insulated; Tv = TB	**Tv**	**518.34**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.544E-04	
Partially Insulated	Wv	1.550E-04	
Fully Insulated	Wv	1.450E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.62**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.040	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**7.72**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0402**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
Average Daily Liquid Surface Temperature	TLA	520.47	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**19.46**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00229**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00789	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00560	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	525.68	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.26	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00215**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00784	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0056951	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	525.51	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	515.78	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Product	Diesel	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Total HAP Emissions =	**0.823**						
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0040	86.18	130	0.00042	0.000004	0.007	**0.00064**
benzene	0.0194	78.11	130	0.00208	0.000023	0.007	**0.00346**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.007	**-**
toluene	0.2205	92.14	130	0.02360	0.000222	0.007	**0.03330**
ethylbenzene	0.0281	106.17	130	0.00301	0.000025	0.007	**0.00369**
xylenes	0.5470	106.17	130	0.05855	0.000477	0.007	**0.07170**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.007	**0.00E+00**
naphthalene	0.0038	128.17	130	4.06E-04	2.74E-06	0.007	**4.12E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.9529
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1972
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6101
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3394
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1067
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0929
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0493
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0025

Monthly Calculations (continued) NOVEMBER

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**6.20**	lb/month
		3.10E-03	ton/month
Time Period		**November**	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**46.45**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0046094	
Partially Insulated	P_{VA}	0.0046268	
Fully Insulated	P_{VA}	0.0043944	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.15	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**509.53**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**509.64**	°R
Fully Insulated: TLA = TB	**TLA**	**508.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**510.67**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**511.14**	**°R**
Fully Insulated; Tv = TB	**Tv**	**508.15**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.093E-04	
Partially Insulated	Wv	1.097E-04	
Fully Insulated	Wv	1.048E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.87**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**5.33**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8125	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0046	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0313**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.92	°R
Average Daily Vapor Pressure Range	ΔPv	0.0013	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0046	psia
Average Daily Liquid Surface Temperature	TLA	509.53	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.92**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.69**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00126**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00528	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00402	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	513.51	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.56	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00117**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00524	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	0.0040756	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	513.32	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	505.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.540**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0028	86.18	130	0.00046	0.000003	0.005	**0.00069**
benzene	0.0137	78.11	130	0.00220	0.000017	0.005	**0.00367**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.1492	92.14	130	0.02408	0.000157	0.005	**0.03397**
ethylbenzene	0.0182	106.17	130	0.00294	0.000017	0.005	**0.00361**
xylenes	0.3534	106.17	130	0.05705	0.000322	0.005	**0.06985**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.005	**0.00E+00**
naphthalene	0.0022	128.17	130	3.53E-04	1.65E-06	0.005	**3.58E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.4598
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.8780
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4420
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2398
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0722
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0627
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0324
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0015

Monthly Calculations (continued) DECEMBER

Tank No.	1		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.51**	lb/month
		2.26E-03	ton/month
Time Period		**December**	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**25.00**	ft
Throughput	Q	**448,680**	gal/month
Turnovers	N	**44.95**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003247074	
Partially Insulated	P_{VA}	0.003257435	
Fully Insulated	P_{VA}	0.003118346	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.39	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.52**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.61**	°R
Fully Insulated: TLA = TB	**TLA**	**498.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**500.45**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**500.83**	**°R**
Fully Insulated; Tv = TB	**Tv**	**498.39**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.860E-05	
Partially Insulated	Wv	7.879E-05	
Fully Insulated	Wv	7.580E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.58**	lb/month
Vapor Space Volume	Vv	8472.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.028	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.93**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	59,974	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8340	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
Vapor Space Outage	Hvo	17.26	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0282**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
Average Daily Liquid Surface Temperature	TLA	499.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**14.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.91**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00082**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00368	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00286	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	503.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.01	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00075**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00365	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	0.0029009	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	502.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.38	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**8,472.69**	ft3
Tank diameter	D	25.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.26	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.26**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.26	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.26**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	12.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**1.71**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	25.00	ft
Tank shell radius	Rs	12.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.388**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0022	86.18	130	0.00049	0.000002	0.003	**0.00074**
benzene	0.0105	78.11	130	0.00232	0.000013	0.003	**0.00386**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.1104	92.14	130	0.02447	0.000112	0.003	**0.03452**
ethylbenzene	0.0129	106.17	130	0.00287	0.000011	0.003	**0.00351**
xylenes	0.2501	106.17	130	0.05543	0.000220	0.003	**0.06787**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0014	128.17	130	3.07E-04	1.01E-06	0.003	**3.12E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.1033
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6514
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3241
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1717
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0495
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0429
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0216
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009

FRT TANK EMISSION CALCULATION

Tank No.	2		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**206.84**	lb/year
		0.10	ton/year
Time Period		**Annual**	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**9,376,077**	gal/yr
Turnovers	N	**40.71**	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.006309848	
Partially Insulated	P_{VA}	0.006354705	
Fully Insulated	P_{VA}	0.005765399	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	516.14	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.86**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**519.07**	°R
Fully Insulated: TLA = TB	**TLA**	**516.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**521.07**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**522.00**	**°R**
Fully Insulated; Tv = TB	**Tv**	**516.14**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.467E-04	
Partially Insulated	Wv	1.475E-04	
Fully Insulated	Wv	1.353E-04	

Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**40.71**	lb/yr
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant: Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**166.14**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,253,269	ft3/yr
Working Loss Turnover Factor	KN	0.9036	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0063	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0458**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.66	°R
Average Daily Vapor Pressure Range	ΔPv	0.0025	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0063	psia
Average Daily Liquid Surface Temperature	TLA	518.86	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.66**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**22.32**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00248**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00766	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00518	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	524.77	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00235**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.00763	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0052737	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	524.65	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	513.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/yr**						
Product	Diesel						
Total HAP Emissions =	**18.192**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0888	86.18	130	0.00043	0.000004	0.006	**0.00065**
benzene	0.4341	78.11	130	0.00210	0.000022	0.006	**0.00349**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	4.8964	92.14	130	0.02367	0.000211	0.006	**0.03340**
ethylbenzene	0.6213	106.17	130	0.00300	0.000023	0.006	**0.00368**
xylenes	12.0692	106.17	130	0.05835	0.000451	0.006	**0.07145**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0823	128.17	130	3.98E-04	2.55E-06	0.006	**4.04E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.8724
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1447
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5823
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3228
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1008
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0878
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0464
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0023

Monthly Calculations - JANUARY

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**7.58**	lb/month
		3.79E-03	ton/month
Time Period		**January**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00277586	
Partially Insulated	P_{VA}	0.00278619	
Fully Insulated	P_{VA}	0.00264788	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.87	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.17**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.27**	°R
Fully Insulated: TLA = TB	**TLA**	**493.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.23**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.67**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.87**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.777E-05	
Partially Insulated	Wv	6.796E-05	
Fully Insulated	Wv	6.495E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.08**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**6.50**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0309**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.29	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Average Daily Liquid Surface Temperature	TLA	495.17	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.29**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.08**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00077**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	0.00319	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	0.00241	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	498.99	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.35	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00071**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.00316	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0024496	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	**0.646**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0038	86.18	130	0.00051	0.000002	0.003	**0.00076**
benzene	0.0180	78.11	130	0.00237	0.000011	0.003	**0.00395**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.1866	92.14	130	0.02462	0.000096	0.003	**0.03474**
ethylbenzene	0.0215	106.17	130	0.00283	0.000010	0.003	**0.00347**
xylenes	0.4141	106.17	130	0.05465	0.000186	0.003	**0.06691**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0022	128.17	130	2.88E-04	8.11E-07	0.003	**2.92E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9726
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5694
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2819
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1477
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0418
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0362
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0180
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) FEBRUARY

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**7.82**	lb/month
		3.91E-03	ton/month
Time Period		**February**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**44.22**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00303582	
Partially Insulated	P_{VA}	0.00305222	
Fully Insulated	P_{VA}	0.0028348	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	495.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**497.65**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**497.80**	°R
Fully Insulated: TLA = TB	**TLA**	**495.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**499.19**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**499.84**	**°R**
Fully Insulated; Tv = TB	**Tv**	**495.75**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.367E-05	
Partially Insulated	Wv	7.398E-05	
Fully Insulated	Wv	6.927E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.32**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.038	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**6.50**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.8451	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0030	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0383**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.02	°R
Average Daily Vapor Pressure Range	ΔPv	0.0010	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0030	psia
Average Daily Liquid Surface Temperature	TLA	497.65	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.02**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.73**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00104**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	0.00360	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	0.00255	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	502.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.89	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00098**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.00357	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0025990	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	502.23	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	**0.669**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0039	86.18	130	0.00050	0.000002	0.003	**0.00075**
benzene	0.0183	78.11	130	0.00234	0.000012	0.003	**0.00390**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.1918	92.14	130	0.02454	0.000105	0.003	**0.03462**
ethylbenzene	0.0223	106.17	130	0.00285	0.000011	0.003	**0.00349**
xylenes	0.4308	106.17	130	0.05510	0.000205	0.003	**0.06746**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0023	128.17	130	2.99E-04	9.21E-07	0.003	**3.03E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.0453
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6149
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3053
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1610
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0461
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0399
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0200
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) — MARCH

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**11.52**	lb/month
		5.76E-03	ton/month
Time Period		**March**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00404199	
Partially Insulated	P_{VA}	0.00407086	
Fully Insulated	P_{VA}	0.0036917	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	503.14	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**505.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**505.94**	°R
Fully Insulated: TLA = TB	**TLA**	**503.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**507.85**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**508.73**	**°R**
Fully Insulated: Tv = TB	**Tv**	**503.14**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.642E-05	
Partially Insulated	Wv	9.694E-05	
Fully Insulated	Wv	8.889E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.28**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**9.24**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0040	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0459**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.15	°R
Average Daily Vapor Pressure Range	ΔPv	0.0016	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0040	psia
Average Daily Liquid Surface Temperature	TLA	505.73	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**21.79**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00164**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00493	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00330	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.52	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.95	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00155**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usi	PVX	0.00491	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0033610	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	511.39	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	500.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.999**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0054	86.18	130	0.00047	0.000003	0.004	**0.00071**
benzene	0.0259	78.11	130	0.00225	0.000015	0.004	**0.00374**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	**-**
toluene	0.2793	92.14	130	0.02423	0.000138	0.004	**0.03419**
ethylbenzene	0.0336	106.17	130	0.00292	0.000014	0.004	**0.00357**
xylenes	0.6507	106.17	130	0.05646	0.000279	0.004	**0.06913**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	**0.00E+00**
naphthalene	0.0039	128.17	130	3.35E-04	1.37E-06	0.004	**3.40E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.3146
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7852
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3936
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2116
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0627
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0544
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0278
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0012

Monthly Calculations (continued) — APRIL

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**16.56**	lb/month
		8.28E-03	ton/month
Time Period		**April**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**41.27**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00590905	
Partially Insulated	P_{VA}	0.00596122	
Fully Insulated	P_{VA}	0.00528233	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	513.54	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**516.88**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**517.14**	°R
Fully Insulated: TLA = TB	**TLA**	**513.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.60**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**520.75**	**°R**
Fully Insulated; Tv = TB	**Tv**	**513.54**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.378E-04	
Partially Insulated	Wv	1.387E-04	
Fully Insulated	Wv	1.246E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.71**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.054	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**12.86**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.8935	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0059	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0540**	**per day**
Average Daily Vapor Temperature Range	ΔTv	27.81	°R
Average Daily Vapor Pressure Range	ΔPv	0.0028	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0059	psia
Average Daily Liquid Surface Temperature	TLA	516.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**27.81**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.35**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00276**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00743	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00467	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	523.83	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00263**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usi	PVX	0.00740	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0047735	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	523.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	510.56	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**1.454**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0072	86.18	130	0.00044	0.000004	0.006	**0.00066**
benzene	0.0351	78.11	130	0.00212	0.000021	0.006	**0.00353**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	0.3936	92.14	130	0.02376	0.000198	0.006	**0.03352**
ethylbenzene	0.0496	106.17	130	0.00299	0.000022	0.006	**0.00366**
xylenes	0.9622	106.17	130	0.05809	0.000420	0.006	**0.07113**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0064	128.17	130	3.88E-04	2.33E-06	0.006	**3.94E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.7777
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.0832
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5498
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3034
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0940
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0818
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0431
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0021

Monthly Calculations (continued) MAY

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**23.72**	lb/month
		1.19E-02	ton/month
Time Period		**May**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00823799	
Partially Insulated	P_{VA}	0.00831923	
Fully Insulated	P_{VA}	0.00726777	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	523.16	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.04**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.35**	°R
Fully Insulated: TLA = TB	**TLA**	**523.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**530.21**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**531.53**	**°R**
Fully Insulated; Tv = TB	**Tv**	**523.16**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.882E-04	
Partially Insulated	Wv	1.896E-04	
Fully Insulated	Wv	1.683E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**5.68**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.059	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**18.04**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0082	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0587**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.78	°R
Average Daily Vapor Pressure Range	ΔPv	0.0041	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0082	psia
Average Daily Liquid Surface Temperature	TLA	527.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**30.78**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00409**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[A	PVX	0.01051	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00641	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	519.35	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00393**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.01048	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0065580	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.67	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	520.02	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**2.100**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0096	86.18	130	0.00041	0.000005	0.008	**0.00061**
benzene	0.0477	78.11	130	0.00201	0.000028	0.008	**0.00335**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.008	**-**
toluene	0.5524	92.14	130	0.02329	0.000271	0.008	**0.03286**
ethylbenzene	0.0723	106.17	130	0.00305	0.000031	0.008	**0.00373**
xylenes	1.4073	106.17	130	0.05933	0.000598	0.008	**0.07265**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.008	**0.00E+00**
naphthalene	0.0104	128.17	130	4.39E-04	3.67E-06	0.008	**4.46E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.3098
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.4315
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.7346
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4146
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1335
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1165
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0628
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0033

Monthly Calculations (continued) JUNE

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**31.37**	lb/month
		1.57E-02	ton/month
Time Period		**June**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**41.27**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.01138761	
Partially Insulated	P_{VA}	0.01150415	
Fully Insulated	P_{VA}	0.00999881	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.15	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**537.34**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.67**	°R
Fully Insulated: TLA = TB	**TLA**	**533.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**540.75**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**542.18**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.15**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.551E-04	
Partially Insulated	Wv	2.570E-04	
Fully Insulated	Wv	2.272E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**7.56**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.060	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**23.81**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.8935	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0597**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.89	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Average Daily Liquid Surface Temperature	TLA	537.34	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**30.48**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00564**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[A	PVX	0.01451	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00887	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	545.31	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.36	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00543**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.01450	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0090664	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	545.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	530.05	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**2.792**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0119	86.18	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.0597	78.11	130	0.00190	0.000036	0.011	**0.00317**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.7148	92.14	130	0.02279	0.000366	0.011	**0.03215**
ethylbenzene	0.0970	106.17	130	0.00309	0.000043	0.011	**0.00379**
xylenes	1.8935	106.17	130	0.06037	0.000842	0.011	**0.07392**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.011	**0.00E+00**
naphthalene	0.0155	128.17	130	4.93E-04	5.69E-06	0.011	**5.00E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.9751
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8742
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9720
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5608
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1873
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1639
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0903
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) JULY

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**37.33**	lb/month
		1.87E-02	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.01342045	
Partially Insulated	P_{VA}	0.01355286	
Fully Insulated	P_{VA}	0.01183892	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	538.60	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**542.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**543.04**	°R
Fully Insulated: TLA = TB	**TLA**	**538.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**546.07**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**547.48**	**°R**
Fully Insulated; Tv = TB	**Tv**	**538.60**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.977E-04	
Partially Insulated	Wv	2.999E-04	
Fully Insulated	Wv	2.663E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**8.80**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.058	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**28.54**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0578**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.11	°R
Average Daily Vapor Pressure Range	ΔPv	0.0064	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
Average Daily Liquid Surface Temperature	TLA	542.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.11**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.76**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00635**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.01692	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.01057	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	550.49	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	534.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00612**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	0.01692	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	0.0107917	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	550.48	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	535.60	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**3.330**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAI}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0136	86.18	130	0.00036	0.000007	0.013	**0.00055**
benzene	0.0691	78.11	130	0.00185	0.000041	0.013	**0.00308**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.013	**-**
toluene	0.8406	92.14	130	0.02252	0.000426	0.013	**0.03177**
ethylbenzene	0.1161	106.17	130	0.00311	0.000051	0.013	**0.00381**
xylenes	2.2709	106.17	130	0.06083	0.001000	0.013	**0.07448**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.013	**0.00E+00**
naphthalene	0.0195	128.17	130	5.22E-04	7.10E-06	0.013	**5.29E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.3803
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	2.1469
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.1193
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.6530
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.2220
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1946
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.1084
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0064

Monthly Calculations (continued) AUGUST

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**34.99**	lb/month
		1.75E-02	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.01277988	
Partially Insulated	P_{VA}	0.01289268	
Fully Insulated	P_{VA}	0.01142435	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	537.44	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**541.10**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**541.39**	°R
Fully Insulated: TLA = TB	**TLA**	**537.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**544.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**545.34**	**°R**
Fully Insulated; Tv = TB	**Tv**	**537.44**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.846E-04	
Partially Insulated	Wv	2.864E-04	
Fully Insulated	Wv	2.575E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**7.71**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.053	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**27.27**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0128	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0529**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.44	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0128	psia
Average Daily Liquid Surface Temperature	TLA	541.10	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.44**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**27.13**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00556**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.01582	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.01026	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	548.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.99	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00534**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	0.01580	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	0.0104641	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	548.17	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	534.61	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**3.119**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAI}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0129	86.18	130	0.00037	0.000007	0.013	**0.00056**
benzene	0.0653	78.11	130	0.00187	0.000040	0.013	**0.00311**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.013	**-**
toluene	0.7906	92.14	130	0.02260	0.000407	0.013	**0.03188**
ethylbenzene	0.1086	106.17	130	0.00310	0.000049	0.013	**0.00380**
xylenes	2.1234	106.17	130	0.06070	0.000950	0.013	**0.07432**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.013	**0.00E+00**
naphthalene	0.0180	128.17	130	5.13E-04	6.65E-06	0.013	**5.21E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.2544
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	2.0619
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0733
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.6241
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.2111
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1850
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.1027
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0060

Monthly Calculations (continued) — SEPTEMBER

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**26.40**	lb/month
		1.32E-02	ton/month
Time Period		**September**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**41.27**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.01000982	
Partially Insulated	P_{VA}	0.01008252	
Fully Insulated	P_{VA}	0.0091281	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.26	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.19**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.42**	°R
Fully Insulated: TLA = TB	**TLA**	**530.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**535.58**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**536.58**	**°R**
Fully Insulated; Tv = TB	**Tv**	**530.26**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.264E-04	
Partially Insulated	Wv	2.276E-04	
Fully Insulated	Wv	2.085E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**5.27**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**21.13**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.8935	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0469**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.85	°R
Average Daily Vapor Pressure Range	ΔPv	0.0039	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Average Daily Liquid Surface Temperature	TLA	533.19	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.85**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.50**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00391**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.01213	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00822	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	539.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.97	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00372**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.01209	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0083713	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	539.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	527.54	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**2.346**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0103	86.18	130	0.00039	0.000006	0.010	**0.00059**
benzene	0.0514	78.11	130	0.00195	0.000032	0.010	**0.00324**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.010	**-**
toluene	0.6071	92.14	130	0.02299	0.000325	0.010	**0.03244**
ethylbenzene	0.0812	106.17	130	0.00308	0.000038	0.010	**0.00377**
xylenes	1.5834	106.17	130	0.05998	0.000735	0.010	**0.07344**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.010	**0.00E+00**
naphthalene	0.0124	128.17	130	4.71E-04	4.78E-06	0.010	**4.78E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.6904
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.6840
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8697
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4974
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1637
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1432
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0782
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) — OCTOBER

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**17.99**	lb/month
		9.00E-03	ton/month
Time Period		**October**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00665544	
Partially Insulated	P_{VA}	0.00669242	
Fully Insulated	P_{VA}	0.00620232	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	518.34	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.47**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**520.64**	°R
Fully Insulated: TLA = TB	**TLA**	**518.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**522.21**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**522.94**	**°R**
Fully Insulated; Tv = TB	**Tv**	**518.34**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.544E-04	
Partially Insulated	Wv	1.550E-04	
Fully Insulated	Wv	1.450E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.19**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.040	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**14.80**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0402**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
Average Daily Liquid Surface Temperature	TLA	520.47	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**19.46**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00229**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00789	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00560	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	525.68	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.26	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00215**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.00784	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0056951	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	525.51	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	515.78	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**1.585**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0076	86.18	130	0.00042	0.000004	0.007	**0.00064**
benzene	0.0374	78.11	130	0.00208	0.000023	0.007	**0.00346**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.007	**-**
toluene	0.4246	92.14	130	0.02360	0.000222	0.007	**0.03330**
ethylbenzene	0.0542	106.17	130	0.00301	0.000025	0.007	**0.00369**
xylenes	1.0535	106.17	130	0.05855	0.000477	0.007	**0.07170**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.007	**0.00E+00**
naphthalene	0.0073	128.17	130	4.06E-04	2.74E-06	0.007	**4.12E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.9529
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1972
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6101
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3394
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1067
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0929
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0493
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0025

Monthly Calculations (continued) — NOVEMBER

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**11.91**	lb/month
		5.96E-03	ton/month
Time Period		**November**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Distillate Fuel Oil No.2**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**41.27**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00460942	
Partially Insulated	P_{VA}	0.00462678	
Fully Insulated	P_{VA}	0.00439442	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.15	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**509.53**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**509.64**	°R
Fully Insulated: TLA = TB	**TLA**	**508.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**510.67**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**511.14**	**°R**
Fully Insulated: Tv = TB	**Tv**	**508.15**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.093E-04	
Partially Insulated	Wv	1.097E-04	
Fully Insulated	Wv	1.048E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.71**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**10.20**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.8935	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0046	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0313**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.92	°R
Average Daily Vapor Pressure Range	ΔPv	0.0013	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0046	psia
Average Daily Liquid Surface Temperature	TLA	509.53	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.92**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.69**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00126**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00528	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00402	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	513.51	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.56	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00117**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.00524	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0040756	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	513.32	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	505.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**1.038**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0055	86.18	130	0.00046	0.000003	0.005	**0.00069**
benzene	0.0263	78.11	130	0.00220	0.000017	0.005	**0.00367**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.2869	92.14	130	0.02408	0.000157	0.005	**0.03397**
ethylbenzene	0.0351	106.17	130	0.00294	0.000017	0.005	**0.00361**
xylenes	0.6797	106.17	130	0.05705	0.000322	0.005	**0.06985**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.005	**0.00E+00**
naphthalene	0.0042	128.17	130	3.53E-04	1.65E-06	0.005	**3.58E-04**

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.4598
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.8780
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4420
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2398
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0722
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0627
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0324
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0015

Monthly Calculations (continued) — DECEMBER

Tank No.	2		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**8.68**	lb/month
		4.34E-03	ton/month
Time Period		**December**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Distillate Fuel Oil No.2**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**34.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**781,340**	gal/month
Turnovers	N	**39.94**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**33.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.00**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003247074	
Partially Insulated	P_{VA}	0.003257435	
Fully Insulated	P_{VA}	0.003118346	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.39	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.52**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.61**	°R
Fully Insulated: TLA = TB	**TLA**	**498.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**500.45**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**500.83**	**°R**
Fully Insulated: Tv = TB	**Tv**	**498.39**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.860E-05	
Partially Insulated	Wv	7.879E-05	
Fully Insulated	Wv	7.580E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.15**	lb/month
Vapor Space Volume	Vv	16706.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.028	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**7.53**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	104,439	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	0.9178	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
Vapor Space Outage	Hvo	17.36	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0282**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
Average Daily Liquid Surface Temperature	TLA	499.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**14.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.91**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00082**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00368	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	0.00286	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	503.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.01	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00075**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	0.00365	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0029009	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	502.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.38	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16,706.69**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.36	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.36**	ft
Tank shell height	Hs	34.00	ft
Liquid Height	HL	17.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1666	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.745**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0043	86.18	130	0.00049	0.000002	0.003	**0.00074**
benzene	0.0201	78.11	130	0.00232	0.000013	0.003	**0.00386**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.2124	92.14	130	0.02447	0.000112	0.003	**0.03452**
ethylbenzene	0.0249	106.17	130	0.00287	0.000011	0.003	**0.00351**
xylenes	0.4811	106.17	130	0.05543	0.000220	0.003	**0.06787**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0027	128.17	130	3.07E-04	1.01E-06	0.003	**3.12E-04**

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.1033
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6514
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3241
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1717
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0495
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0429
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0216
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009

FRT TANK EMISSION CALCULATION

Tank No.	3		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**217.70**	lb/year
		0.11	ton/year
Time Period		**Annual**	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**11,044,732**	gal/yr
Turnovers	N	**46.49844051**	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.006309848	
Partially Insulated	P_{VA}	0.006354705	
Fully Insulated	P_{VA}	0.005765399	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	516.14	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.86**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**519.07**	°R
Fully Insulated: TLA = TB	**TLA**	**516.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**521.07**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**522.00**	**°R**
Fully Insulated; Tv = TB	**Tv**	**516.14**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.467E-04	
Partially Insulated	Wv	1.475E-04	
Fully Insulated	Wv	1.353E-04	

Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**41.87**	lb/yr
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**175.83**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,476,313	ft3/yr
Working Loss Turnover Factor	KN	0.8118	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0063	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0458**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.66	°R
Average Daily Vapor Pressure Range	ΔPv	0.0025	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0063	psia
Average Daily Liquid Surface Temperature	TLA	518.86	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.66**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**22.32**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00248**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00766	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00518	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	524.77	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00235**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00763	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0052737	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	524.65	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	513.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/yr						
Product	Diesel						
Total HAP Emissions =	**19.147**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0934	86.18	130	0.00043	0.000004	0.006	**0.00065**
benzene	0.4569	78.11	130	0.00210	0.000022	0.006	**0.00349**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	5.1534	92.14	130	0.02367	0.000211	0.006	**0.03340**
ethylbenzene	0.6539	106.17	130	0.00300	0.000023	0.006	**0.00368**
xylenes	12.7024	106.17	130	0.05835	0.000451	0.006	**0.07145**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0867	128.17	130	3.98E-04	2.55E-06	0.006	**4.04E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.8724
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1447
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5823
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3228
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1008
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0878
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0464
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0023

Monthly Calculations - JANUARY

Tank No. 3

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	7.99	lb/month
		3.99E-03	ton/month
Time Period		**January**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**45.62**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0027759	
Partially Insulated	P_{VA}	0.0027862	
Fully Insulated	P_{VA}	0.0026479	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.87	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.17**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.27**	°R
Fully Insulated: TLA = TB	**TLA**	**493.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.23**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.67**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.87**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.777E-05	
Partially Insulated	Wv	6.796E-05	
Fully Insulated	Wv	6.495E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.11**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**6.87**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8242	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0309**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.29	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Average Daily Liquid Surface Temperature	TLA	495.17	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.29**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.08**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00077**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00319	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00241	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	498.99	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.35	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00071**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00316	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0024496	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.681**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0040	86.18	130	0.00051	0.000002	0.003	**0.00076**
benzene	0.0190	78.11	130	0.00237	0.000011	0.003	**0.00395**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.1966	92.14	130	0.02462	0.000096	0.003	**0.03474**
ethylbenzene	0.0226	106.17	130	0.00283	0.000010	0.003	**0.00347**
xylenes	0.4364	106.17	130	0.05465	0.000186	0.003	**0.06691**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0023	128.17	130	2.88E-04	8.11E-07	0.003	**2.92E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9726
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5694
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2819
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1477
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0418
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0362
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0180
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) **FEBRUARY**

Tank No. 3

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	8.25	lb/month
		4.12E-03	ton/month
Time Period		**February**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**50.51**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0030358	
Partially Insulated	P_{VA}	0.0030522	
Fully Insulated	P_{VA}	0.0028348	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	495.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**497.65**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**497.80**	°R
Fully Insulated: TLA = TB	**TLA**	**495.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**499.19**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**499.84**	**°R**
Fully Insulated; Tv = TB	**Tv**	**495.75**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.367E-05	
Partially Insulated	Wv	7.398E-05	
Fully Insulated	Wv	6.927E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.35**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.038	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**6.89**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7606	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0030	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0383**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.02	°R
Average Daily Vapor Pressure Range	ΔPv	0.0010	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0030	psia
Average Daily Liquid Surface Temperature	TLA	497.65	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.02**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.73**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00104**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00360	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00255	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	502.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.89	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00098**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00357	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0025990	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	502.23	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**0.706**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0041	86.18	130	0.00050	0.000002	0.003	**0.00075**
benzene	0.0193	78.11	130	0.00234	0.000012	0.003	**0.00390**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.2024	92.14	130	0.02454	0.000105	0.003	**0.03462**
ethylbenzene	0.0235	106.17	130	0.00285	0.000011	0.003	**0.00349**
xylenes	0.4544	106.17	130	0.05510	0.000205	0.003	**0.06746**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0025	128.17	130	2.99E-04	9.21E-07	0.003	**3.03E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.0453
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6149
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3053
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1610
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0461
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0399
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0200
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) MARCH

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	3		
Total Losses (Eq.1-1: LT = LS+LW)	LT	12.13	lb/month
		6.06E-03	ton/month
Time Period		March	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1175.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	35.00	ft
Diameter	D	35.00	ft
Throughput	Q	920,394	gal/month
Turnovers	N	45.62	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	34.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	17.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.004042	
Partially Insulated	P_{VA}	0.0040709	
Fully Insulated	P_{VA}	0.0036917	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	501.10	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	503.14	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	505.73	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	505.94	°R
Fully Insulated: TLA = TB	TLA	503.1	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	507.85	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	508.73	°R
Fully Insulated; Tv = TB	Tv	503.14	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.642E-05	
Partially Insulated	Wv	9.694E-05	
Fully Insulated	Wv	8.889E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	2.35	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	9.78	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8242	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0040	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0459	per day
Average Daily Vapor Temperature Range	ΔTv	23.15	°R
Average Daily Vapor Pressure Range	ΔPv	0.0016	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0040	psia
Average Daily Liquid Surface Temperature	TLA	505.73	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	23.15	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	21.79	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00164	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00493	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00330	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.52	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.95	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00155	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00491	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0033610	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	511.39	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	500.49	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	17,187.74	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	17.86	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.36	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	2.40	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	1.051

	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0057	86.18	130	0.00047	0.000003	0.004	0.00071
benzene	0.0273	78.11	130	0.00225	0.000015	0.004	0.00374
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	-
toluene	0.2938	92.14	130	0.02423	0.000138	0.004	0.03419
ethylbenzene	0.0354	106.17	130	0.00292	0.000014	0.004	0.00357
xylenes	0.6846	106.17	130	0.05646	0.000279	0.004	0.06913
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	0.00E+00
naphthalene	0.0041	128.17	130	3.35E-04	1.37E-06	0.004	3.40E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.3146
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7852
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3936
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2116
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0627
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0544
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0278
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0012

Monthly Calculations (continued) APRIL

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	3		
Total Losses (Eq.1-1: LT = LS+LW)	LT	17.42	lb/month
		8.71E-03	ton/month
Time Period		April	
Nearest US Location	lew York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1516.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	35.00	ft
Diameter	D	35.00	ft
Throughput	Q	920,394	gal/month
Turnovers	N	47.14	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	34.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	17.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Riveted	
Tank Shell Color (pick from drop down list)		Gray, light	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.58	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0059091	
Partially Insulated	P_{VA}	0.0059612	
Fully Insulated	P_{VA}	0.0052823	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	510.90	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	513.54	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	516.88	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	517.14	°R
Fully Insulated: TLA = TB	TLA	513.5	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	519.60	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	520.75	°R
Fully Insulated; Tv = TB	Tv	513.54	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.378E-04	
Partially Insulated	Wv	1.387E-04	
Fully Insulated	Wv	1.246E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	3.81	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.054	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	13.61	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8030	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0059	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0540	per day
Average Daily Vapor Temperature Range	ΔTv	27.81	°R
Average Daily Vapor Pressure Range	ΔPv	0.0028	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0059	psia
Average Daily Liquid Surface Temperature	TLA	516.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	27.81	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	26.35	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00276	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00743	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00467	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	523.83	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00263	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00740	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0047735	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	523.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	510.56	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	17,187.74	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	17.86	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.36	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	2.40	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	1.530

	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0076	86.18	130	0.00044	0.000004	0.006	0.00066
benzene	0.0370	78.11	130	0.00212	0.000021	0.006	0.00353
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	-
toluene	0.4140	92.14	130	0.02376	0.000198	0.006	0.03352
ethylbenzene	0.0521	106.17	130	0.00299	0.000022	0.006	0.00366
xylenes	1.0121	106.17	130	0.05809	0.000420	0.006	0.07113
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	0.00E+00
naphthalene	0.0068	128.17	130	3.88E-04	2.33E-06	0.006	3.94E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.7777
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.0832
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5498
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3034
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0940
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0818
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0431
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0021

Monthly Calculations (continued) **MAY**

Tank No.	3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**24.93**	lb/month
		1.25E-02	ton/month
Time Period		**May**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**45.62**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.008238	
Partially Insulated	P_{VA}	0.0083192	
Fully Insulated	P_{VA}	0.0072678	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	523.16	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.04**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.35**	°R
Fully Insulated: TLA = TB	**TLA**	**523.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**530.21**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**531.53**	**°R**
Fully Insulated; Tv = TB	**Tv**	**523.16**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.882E-04	
Partially Insulated	Wv	1.896E-04	
Fully Insulated	Wv	1.683E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**5.84**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.059	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**19.09**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8242	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0082	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0587**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.78	°R
Average Daily Vapor Pressure Range	ΔPv	0.0041	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0082	psia
Average Daily Liquid Surface Temperature	TLA	527.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**30.78**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00409**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01051	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00641	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	519.35	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00393**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01048	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0065580	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	534.67	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.02	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Product	Diesel	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Total HAP Emissions =	**2.207**						
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0101	86.18	130	0.00041	0.000005	0.008	**0.00061**
benzene	0.0501	78.11	130	0.00201	0.000028	0.008	**0.00335**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.008	**-**
toluene	0.5805	92.14	130	0.02329	0.000271	0.008	**0.03286**
ethylbenzene	0.0760	106.17	130	0.00305	0.000031	0.008	**0.00373**
xylenes	1.4788	106.17	130	0.05933	0.000598	0.008	**0.07265**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.008	**0.00E+00**
naphthalene	0.0109	128.17	130	4.39E-04	3.67E-06	0.008	**4.46E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.3098
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.4315
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.7346
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4146
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1335
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1165
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0628
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0033

Monthly Calculations (continued) **JUNE**

Tank No.	3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**32.98**	lb/month
		1.65E-02	ton/month
Time Period		**June**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**47.14**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0113876	
Partially Insulated	P_{VA}	0.0115041	
Fully Insulated	P_{VA}	0.0099988	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.15	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**537.34**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.67**	°R
Fully Insulated: TLA = TB	**TLA**	**533.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**540.75**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**542.18**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.15**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.551E-04	
Partially Insulated	Wv	2.570E-04	
Fully Insulated	Wv	2.272E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**7.77**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.060	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**25.20**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8030	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0597**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.89	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Average Daily Liquid Surface Temperature	TLA	537.34	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**30.48**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00564**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01451	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00887	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	545.31	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.36	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00543**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01450	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0090664	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	545.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.05	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Product	Diesel	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Total HAP Emissions =	**2.936**						
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0125	86.18	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.0628	78.11	130	0.00190	0.000036	0.011	**0.00317**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.7515	92.14	130	0.02279	0.000366	0.011	**0.03215**
ethylbenzene	0.1019	106.17	130	0.00309	0.000043	0.011	**0.00379**
xylenes	1.9907	106.17	130	0.06037	0.000842	0.011	**0.07392**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.011	**0.00E+00**
naphthalene	0.0163	128.17	130	4.93E-04	5.69E-06	0.011	**5.00E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.9751
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8742
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9720
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5608
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1873
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1639
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0903
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) — JULY

Tank No.	3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**39.24**	lb/month
		1.96E-02	ton/month
Time Period		**July**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**45.62**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0134204	
Partially Insulated	P_{VA}	0.0135529	
Fully Insulated	P_{VA}	0.0118389	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	538.60	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**542.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**543.04**	°R
Fully Insulated: TLA = TB	**TLA**	**538.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**546.07**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**547.48**	**°R**
Fully Insulated; Tv = TB	**Tv**	**538.60**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.977E-04	
Partially Insulated	Wv	2.999E-04	
Fully Insulated	Wv	2.663E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**9.05**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.058	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**30.19**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8242	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0578**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.11	°R
Average Daily Vapor Pressure Range	ΔPv	0.0064	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
Average Daily Liquid Surface Temperature	TLA	542.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.11**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.76**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00635**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01692	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.01057	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	550.49	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	534.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00612**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01692	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0107917	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	550.48	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	535.60	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	**3.499**

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$ — Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0143	86.18	130	0.00036	0.000007	0.013	**0.00055**
benzene	0.0726	78.11	130	0.00185	0.000041	0.013	**0.00308**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.013	**-**
toluene	0.8834	92.14	130	0.02252	0.000426	0.013	**0.03177**
ethylbenzene	0.1220	106.17	130	0.00311	0.000051	0.013	**0.00381**
xylenes	2.3866	106.17	130	0.06083	0.001000	0.013	**0.07448**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.013	**0.00E+00**
naphthalene	0.0205	128.17	130	5.22E-04	7.10E-06	0.013	**5.29E-04**

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.3803
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	2.1469
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.1193
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.6530
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.2220
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1946
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.1084
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0064

Monthly Calculations (continued) — AUGUST

Tank No.	3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**36.78**	lb/month
		1.84E-02	ton/month
Time Period		**August**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**45.62**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0127799	
Partially Insulated	P_{VA}	0.0128927	
Fully Insulated	P_{VA}	0.0114243	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	537.44	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**541.10**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**541.39**	°R
Fully Insulated: TLA = TB	**TLA**	**537.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**544.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**545.34**	**°R**
Fully Insulated; Tv = TB	**Tv**	**537.44**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.846E-04	
Partially Insulated	Wv	2.864E-04	
Fully Insulated	Wv	2.575E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**7.93**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.053	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**28.85**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8242	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0128	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0529**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.44	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0128	psia
Average Daily Liquid Surface Temperature	TLA	541.10	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.44**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**27.13**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00556**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01582	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.01026	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	548.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.99	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00534**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01580	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0104641	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	548.17	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	534.61	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	**3.279**

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$ — Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0135	86.18	130	0.00037	0.000007	0.013	**0.00056**
benzene	0.0687	78.11	130	0.00187	0.000040	0.013	**0.00311**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.013	**-**
toluene	0.8312	92.14	130	0.02260	0.000407	0.013	**0.03188**
ethylbenzene	0.1142	106.17	130	0.00310	0.000049	0.013	**0.00380**
xylenes	2.2326	106.17	130	0.06070	0.000950	0.013	**0.07432**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.013	**0.00E+00**
naphthalene	0.0189	128.17	130	5.13E-04	6.65E-06	0.013	**5.21E-04**

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.2544
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	2.0619
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0733
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.6241
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.2111
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1850
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.1027
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0060

Monthly Calculations (continued) SEPTEMBER

Tank No.	3						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**5.42**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**27.79**	lb/month	Vapor Space Volume	Vv	17187.7	ft3
		1.39E-02	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Nearest US Location	**lew York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**22.37**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Product Type	**Distillate Fuel Oil No.2**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=:	KN	0.8030	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.10**	lb/gal	Stock Vapor Density	Wv	0.0002	lb/ft3
Average Reid Vapor Pressure	RVP	**0.02**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**12.10**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
				Vapor Space Outage	Hvo	17.86	ft
Tank design data							
Shell height	Hs	**35.00**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0469**	**per day**
Diameter	D	**35.00**	ft	Average Daily Vapor Temperature Range	ΔTv	24.85	°R
Throughput	Q	**920,394**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0039	psi
Turnovers	N	**47.14**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Roof Type:		**Cone**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	533.19	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft				
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**24.85**	**°R**
Tank Construction (pick from drop down list)		**Riveted**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**23.50**	°R
Tank Shell Color (pick from drop down list)		**Gray, light**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00391**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01213	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00822	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	539.40	°R
Not Insulated	P_{VA}	0.0100098		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.97	°R
Partially Insulated	P_{VA}	0.0100825					
Fully Insulated	P_{VA}	0.0091281		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00372**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01209	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0083713	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	539.29	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	527.54	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.26	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**17,187.74**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.19**	°R	Tank diameter	D	35.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.42**	°R	Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Fully Insulated: TLA = TB	**TLA**	**530.3**					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	35.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**535.58**	**°R**	Liquid Height	HL	17.50	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**536.58**	**°R**	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Fully Insulated; Tv = TB	**Tv**	**530.26**	**°R**				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	2.264E-04		Tank shell radius	Rs	17.50	ft
Partially Insulated	Wv	2.276E-04					
Fully Insulated	Wv	2.085E-04		**Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16**	**HRO**	**2.40**	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
				Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**2.469**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAI}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0108	86.18	130	0.00039	0.000006	0.010	**0.00059**
benzene	0.0541	78.11	130	0.00195	0.000032	0.010	**0.00324**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.010	-
toluene	0.6390	92.14	130	0.02299	0.000325	0.010	**0.03244**
ethylbenzene	0.0855	106.17	130	0.00308	0.000038	0.010	**0.00377**
xylenes	1.6667	106.17	130	0.05998	0.000735	0.010	**0.07344**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.010	**0.00E+00**
naphthalene	0.0131	128.17	130	4.71E-04	4.78E-06	0.010	**4.78E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.6904
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.6840
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8697
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4974
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1637
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1432
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0782
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) OCTOBER

Tank No.	3						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.28**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**18.94**	lb/month	Vapor Space Volume	Vv	17187.7	ft3
		9.47E-03	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.040	per day
Nearest US Location	**lew York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**15.66**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Product Type	**Distillate Fuel Oil No.2**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=:	KN	0.8242	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.10**	lb/gal	Stock Vapor Density	Wv	0.0002	lb/ft3
Average Reid Vapor Pressure	RVP	**0.02**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**12.10**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
				Vapor Space Outage	Hvo	17.86	ft
Tank design data							
Shell height	Hs	**35.00**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0402**	**per day**
Diameter	D	**35.00**	ft	Average Daily Vapor Temperature Range	ΔTv	20.83	°R
Throughput	Q	**920,394**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Turnovers	N	**45.62**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Roof Type:		**Cone**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	520.47	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft				
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**20.83**	**°R**
Tank Construction (pick from drop down list)		**Riveted**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**19.46**	°R
Tank Shell Color (pick from drop down list)		**Gray, light**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00229**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00789	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00560	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	525.68	°R
Not Insulated	P_{VA}	0.0066554		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.26	°R
Partially Insulated	P_{VA}	0.0066924					
Fully Insulated	P_{VA}	0.0062023		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00215**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00784	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0056951	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	525.51	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	515.78	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	518.34	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**17,187.74**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.47**	°R	Tank diameter	D	35.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**520.64**	°R	Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Fully Insulated: TLA = TB	**TLA**	**518.3**					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	35.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**522.21**	**°R**	Liquid Height	HL	17.50	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**522.94**	**°R**	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Fully Insulated; Tv = TB	**Tv**	**518.34**	**°R**				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	1.544E-04		Tank shell radius	Rs	17.50	ft
Partially Insulated	Wv	1.550E-04					
Fully Insulated	Wv	1.450E-04		**Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16**	**HRO**	**2.40**	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
				Tank shell radius	Rs	17.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**1.668**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAI}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0080	86.18	130	0.00042	0.000004	0.007	**0.00064**
benzene	0.0394	78.11	130	0.00208	0.000023	0.007	**0.00346**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.007	-
toluene	0.4470	92.14	130	0.02360	0.000222	0.007	**0.03330**
ethylbenzene	0.0571	106.17	130	0.00301	0.000025	0.007	**0.00369**
xylenes	1.1090	106.17	130	0.05855	0.000477	0.007	**0.07170**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.007	**0.00E+00**
naphthalene	0.0077	128.17	130	4.06E-04	2.74E-06	0.007	**4.12E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.9529
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1972
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6101
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3394
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1067
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0929
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0493
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0025

Monthly Calculations (continued) NOVEMBER

Tank No.	3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**12.56**	lb/month
		6.28E-03	ton/month
Time Period		**November**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**47.14**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0046094	
Partially Insulated	P_{VA}	0.0046268	
Fully Insulated	P_{VA}	0.0043944	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.15	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**509.53**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**509.64**	°R
Fully Insulated: TLA = TB	**TLA**	**508.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**510.67**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**511.14**	**°R**
Fully Insulated; Tv = TB	**Tv**	**508.15**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.093E-04	
Partially Insulated	Wv	1.097E-04	
Fully Insulated	Wv	1.048E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.76**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**10.80**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8030	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0046	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0313**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.92	°R
Average Daily Vapor Pressure Range	ΔPv	0.0013	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0046	psia
Average Daily Liquid Surface Temperature	TLA	509.53	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.92**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.69**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00126**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00528	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00402	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	513.51	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.56	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00117**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00524	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0040756	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	513.32	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	505.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	**1.094**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0058	86.18	130	0.00046	0.000003	0.005	**0.00069**
benzene	0.0277	78.11	130	0.00220	0.000017	0.005	**0.00367**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	-
toluene	0.3024	92.14	130	0.02408	0.000157	0.005	**0.03397**
ethylbenzene	0.0370	106.17	130	0.00294	0.000017	0.005	**0.00361**
xylenes	0.7166	106.17	130	0.05705	0.000322	0.005	**0.06985**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.005	**0.00E+00**
naphthalene	0.0044	128.17	130	3.53E-04	1.65E-06	0.005	**3.58E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.4598
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.8780
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4420
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2398
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0722
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0627
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0324
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0015

Monthly Calculations (continued) DECEMBER

Tank No.	3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**9.15**	lb/month
		4.57E-03	ton/month
Time Period		**December**	
Nearest US Location	**lew York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**35.00**	ft
Diameter	D	**35.00**	ft
Throughput	Q	**920,394**	gal/month
Turnovers	N	**45.62**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**34.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**17.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Riveted**	
Tank Shell Color (pick from drop down list)		**Gray, light**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.58**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003247074	
Partially Insulated	P_{VA}	0.003257435	
Fully Insulated	P_{VA}	0.003118346	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.39	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.52**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.61**	°R
Fully Insulated: TLA = TB	**TLA**	**498.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**500.45**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**500.83**	**°R**
Fully Insulated; Tv = TB	**Tv**	**498.39**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.860E-05	
Partially Insulated	Wv	7.879E-05	
Fully Insulated	Wv	7.580E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.18**	lb/month
Vapor Space Volume	Vv	17187.7	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.028	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**7.97**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	123,026	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8242	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
Vapor Space Outage	Hvo	17.86	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0282**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0000	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
Average Daily Liquid Surface Temperature	TLA	499.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**14.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.91**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00082**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00368	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00286	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	503.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.01	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00075**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00365	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0029009	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	502.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.38	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**17,187.74**	ft3
Tank diameter	D	35.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	17.86	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**17.86**	ft
Tank shell height	Hs	35.00	ft
Liquid Height	HL	17.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.36	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.36**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	17.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**2.40**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	35.00	ft
Tank shell radius	Rs	17.50	ft

HAPS Speciation	lb/month						
Product	Diesel						
Total HAP Emissions =	**0.786**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0045	86.18	130	0.00049	0.000002	0.003	**0.00074**
benzene	0.0212	78.11	130	0.00232	0.000013	0.003	**0.00386**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	-
toluene	0.2239	92.14	130	0.02447	0.000112	0.003	**0.03452**
ethylbenzene	0.0262	106.17	130	0.00287	0.000011	0.003	**0.00351**
xylenes	0.5071	106.17	130	0.05543	0.000220	0.003	**0.06787**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0028	128.17	130	3.07E-04	1.01E-06	0.003	**3.12E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.1033
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6514
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3241
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1717
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0495
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0429
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0216
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009

FRT TANK EMISSION CALCULATION

Tank No.	9		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2,980.93**	lb/year
		1.49	ton/year
Time Period		**Annual**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**157,504,601**	gal/yr
Turnovers	N	**39.90**	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.005755914	
Partially Insulated	P_{VA}	0.005773709	
Fully Insulated	P_{VA}	0.005534669	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	514.92	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**516.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**516.19**	°R
Fully Insulated: TLA = TB	**TLA**	**514.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**517.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.45**	**°R**
Fully Insulated; Tv = TB	**Tv**	**514.92**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.349E-04	
Partially Insulated	Wv	1.352E-04	
Fully Insulated	Wv	1.302E-04	

Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**372.77**	lb/yr
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2,608.16**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	21,053,115	ft3/yr
Working Loss Turnover Factor	KN	0.9186	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0058	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0261**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.54	°R
Average Daily Vapor Pressure Range	ΔPv	0.0015	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0058	psia
Average Daily Liquid Surface Temperature	TLA	516.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.54**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00150**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00655	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00505	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.21	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00137**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00650	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0051236	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	519.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	512.64	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	lb/yr						
Product	Diesel						
Total HAP Emissions =	**261.483**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	1.3040	86.18	130	0.00044	0.000004	0.006	**0.00066**
benzene	6.3478	78.11	130	0.00213	0.000020	0.006	**0.00354**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	70.9328	92.14	130	0.02380	0.000193	0.006	**0.03357**
ethylbenzene	8.9052	106.17	130	0.00299	0.000021	0.006	**0.00366**
xylenes	172.8473	106.17	130	0.05798	0.000409	0.006	**0.07100**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	1.1461	128.17	130	3.84E-04	2.24E-06	0.006	**3.90E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.7412
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.0595
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5373
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2960
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0915
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0796
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0418
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0020

Monthly Calculations - JANUARY

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**117.29**	lb/month
		5.86E-02	ton/month
Time Period		**January**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**39.15**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00264561	
Partially Insulated	P_{VA}	0.00264987	
Fully Insulated	P_{VA}	0.00259212	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.29	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**493.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**493.89**	°R
Fully Insulated: TLA = TB	**TLA**	**493.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**494.31**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**494.50**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.29**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.484E-05	
Partially Insulated	Wv	6.492E-05	
Fully Insulated	Wv	6.366E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**11.15**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**106.14**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9330	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0026	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0191**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.41	°R
Average Daily Vapor Pressure Range	ΔPv	0.0006	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0026	psia
Average Daily Liquid Surface Temperature	TLA	493.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.41**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00055**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00293	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00238	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	496.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00049**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00291	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0024131	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	496.44	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**9.978**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0600	86.18	130	0.00051	0.000002	0.003	**0.00077**
benzene	0.2802	78.11	130	0.00239	0.000011	0.003	**0.00398**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	2.8932	92.14	130	0.02467	0.000092	0.003	**0.03480**
ethylbenzene	0.3307	106.17	130	0.00282	0.000009	0.003	**0.00345**
xylenes	6.3805	106.17	130	0.05440	0.000176	0.003	**0.06661**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0331	128.17	130	2.83E-04	7.58E-07	0.003	**2.87E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9357
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5463
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2700
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1410
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0397
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0343
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0170
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) **FEBRUARY**

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**116.99**	lb/month
		5.85E-02	ton/month
Time Period		**February**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**43.34**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00283126	
Partially Insulated	P_{VA}	0.0028379	
Fully Insulated	P_{VA}	0.00274842	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.90	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.78**	°R
Fully Insulated: TLA = TB	**TLA**	**494.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.66**	**°R**
Fully Insulated; Tv = TB	**Tv**	**494.90**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.910E-05	
Partially Insulated	Wv	6.922E-05	
Fully Insulated	Wv	6.728E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.87**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.023	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**104.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8589	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0229**	**per day**
Average Daily Vapor Temperature Range	ΔTv	13.34	°R
Average Daily Vapor Pressure Range	ΔPv	0.0007	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Average Daily Liquid Surface Temperature	TLA	495.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**13.34**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.05**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00069**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00319	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00251	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	499.05	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.38	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00062**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00316	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0025428	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.77	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**9.985**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0591	86.18	130	0.00050	0.000002	0.003	**0.00076**
benzene	0.2769	78.11	130	0.00237	0.000011	0.003	**0.00394**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	2.8785	92.14	130	0.02460	0.000098	0.003	**0.03471**
ethylbenzene	0.3318	106.17	130	0.00284	0.000010	0.003	**0.00347**
xylenes	6.4050	106.17	130	0.05475	0.000190	0.003	**0.06704**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0340	128.17	130	2.91E-04	8.34E-07	0.003	**2.95E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9882
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5791
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2869
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1505
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0427
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0370
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0184
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) — MARCH

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**166.23**	lb/month
		8.31E-02	ton/month
Time Period		**March**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**39.15**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0036856	
Partially Insulated	P_{VA}	0.00369705	
Fully Insulated	P_{VA}	0.00354332	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	501.98	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**503.10**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**503.19**	°R
Fully Insulated: TLA = TB	**TLA**	**502.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**504.01**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**504.39**	**°R**
Fully Insulated; Tv = TB	**Tv**	**501.98**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.859E-05	
Partially Insulated	Wv	8.880E-05	
Fully Insulated	Wv	8.551E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**21.22**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.027	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**145.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9330	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0037	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0266**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.40	°R
Average Daily Vapor Pressure Range	ΔPv	0.0010	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0037	psia
Average Daily Liquid Surface Temperature	TLA	503.10	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.40**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.04**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00100**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00422	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00322	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.95	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00091**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00418	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0032649	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	506.69	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	499.68	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**14.354**

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0797	86.18	130	0.00048	0.000003	0.004	**0.00072**
benzene	0.3788	78.11	130	0.00228	0.000014	0.004	**0.00379**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	**-**
toluene	4.0453	92.14	130	0.02433	0.000127	0.004	**0.03433**
ethylbenzene	0.4816	106.17	130	0.00290	0.000013	0.004	**0.00355**
xylenes	9.3148	106.17	130	0.05603	0.000253	0.004	**0.06861**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	**0.00E+00**
naphthalene	0.0537	128.17	130	3.23E-04	1.21E-06	0.004	**3.28E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.2212
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7258
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3627
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1938
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0568
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0492
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0250
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0011

Monthly Calculations (continued) — APRIL

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**230.88**	lb/month
		1.15E-01	ton/month
Time Period		**April**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**40.45**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00527152	
Partially Insulated	P_{VA}	0.0052918	
Fully Insulated	P_{VA}	0.00502049	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	512.04	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.48**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.59**	°R
Fully Insulated: TLA = TB	**TLA**	**512.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.65**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.14**	**°R**
Fully Insulated; Tv = TB	**Tv**	**512.04**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.241E-04	
Partially Insulated	Wv	1.244E-04	
Fully Insulated	Wv	1.188E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**33.15**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**197.74**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9083	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0053	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0307**	**per day**
Average Daily Vapor Temperature Range	ΔTv	17.80	°R
Average Daily Vapor Pressure Range	ΔPv	0.0016	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0053	psia
Average Daily Liquid Surface Temperature	TLA	513.48	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**17.80**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.34**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00159**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00612	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00453	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	517.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00146**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00607	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0046049	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	517.68	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	509.51	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**20.198**

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.1029	86.18	130	0.00045	0.000004	0.005	**0.00067**
benzene	0.4984	78.11	130	0.00216	0.000019	0.005	**0.00359**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	5.5204	92.14	130	0.02391	0.000178	0.005	**0.03373**
ethylbenzene	0.6859	106.17	130	0.00297	0.000019	0.005	**0.00364**
xylenes	13.3043	106.17	130	0.05762	0.000372	0.005	**0.07056**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.005	**0.00E+00**
naphthalene	0.0858	128.17	130	3.72E-04	1.99E-06	0.005	**3.77E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.6240
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9837
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4974
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2724
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0833
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0724
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0378
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018

Monthly Calculations (continued) — MAY

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	LT	323.31	lb/month
		1.62E-01	ton/month
Time Period		May	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1760.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	45.00	ft
Diameter	D	125.00	ft
Throughput	Q	13,125,383	gal/month
Turnovers	N	39.15	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	44.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	22.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00725113	
Partially Insulated	P_{VA}	0.00728235	
Fully Insulated	P_{VA}	0.00686583	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	520.10	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	521.42	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	523.09	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	523.22	°R
Fully Insulated: TLA = TB	TLA	521.4	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	524.46	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	525.03	°R
Fully Insulated; Tv = TB	Tv	521.42	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.675E-04	
Partially Insulated	Wv	1.680E-04	
Fully Insulated	Wv	1.595E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	49.14	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.033	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	274.18	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=:	KN	0.9330	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0073	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0327	per day
Average Daily Vapor Temperature Range	ΔTv	19.16	°R
Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0073	psia
Average Daily Liquid Surface Temperature	TLA	523.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	19.16	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	17.68	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00227	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00846	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00620	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	527.88	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	518.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00210	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00840	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0062992	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	527.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	518.80	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	292,095.51	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	23.80	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	1.30	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	8.57	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	28.539

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.1347	86.18	130	0.00042	0.000005	0.007	0.00063
benzene	0.6637	78.11	130	0.00205	0.000025	0.007	0.00342
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.007	-
toluene	7.5907	92.14	130	0.02348	0.000240	0.007	0.03312
ethylbenzene	0.9788	106.17	130	0.00303	0.000027	0.007	0.00371
xylenes	19.0352	106.17	130	0.05888	0.000523	0.007	0.07209
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.007	0.00E+00
naphthalene	0.1355	128.17	130	4.19E-04	3.08E-06	0.007	4.25E-04

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.0893
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.2865
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6575
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3679
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1168
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0544
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) — JUNE

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	LT	423.70	lb/month
		2.12E-01	ton/month
Time Period		June	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1898.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	45.00	ft
Diameter	D	125.00	ft
Throughput	Q	13,125,383	gal/month
Turnovers	N	40.45	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	44.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	22.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00997505	
Partially Insulated	P_{VA}	0.01001965	
Fully Insulated	P_{VA}	0.00942513	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	529.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.27	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	533.08	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	533.22	°R
Fully Insulated: TLA = TB	TLA	531.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	534.55	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	535.16	°R
Fully Insulated; Tv = TB	Tv	531.27	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-04	
Partially Insulated	Wv	2.268E-04	
Fully Insulated	Wv	2.149E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	63.45	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	360.25	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=:	KN	0.9083	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0324	per day
Average Daily Vapor Temperature Range	ΔTv	19.36	°R
Average Daily Vapor Pressure Range	ΔPv	0.0030	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Average Daily Liquid Surface Temperature	TLA	533.08	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	19.36	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	17.95	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00303	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01159	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00856	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	537.92	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.24	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00282	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01152	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0086952	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	537.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	528.73	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	292,095.51	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	23.80	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	1.30	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	8.57	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	37.644

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.1648	86.18	130	0.00039	0.000006	0.010	0.00059
benzene	0.8251	78.11	130	0.00195	0.000032	0.010	0.00324
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.010	-
toluene	9.7448	92.14	130	0.02300	0.000324	0.010	0.03245
ethylbenzene	1.3027	106.17	130	0.00307	0.000038	0.010	0.00376
xylenes	25.4074	106.17	130	0.05997	0.000732	0.010	0.07342
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.010	0.00E+00
naphthalene	0.1994	128.17	130	4.71E-04	4.76E-06	0.010	4.77E-04

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.6831
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.6791
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8671
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4958
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1631
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1426
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0779
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) JULY

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**507.14**	lb/month
		2.54E-01	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**39.15**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0118118	
Partially Insulated	P_{VA}	0.0118627	
Fully Insulated	P_{VA}	0.01118357	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	536.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.52**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**538.66**	°R
Fully Insulated: TLA = TB	**TLA**	**536.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.97**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.58**	**°R**
Fully Insulated; Tv = TB	**Tv**	**536.75**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.650E-04	
Partially Insulated	Wv	2.658E-04	
Fully Insulated	Wv	2.524E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**73.35**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**433.79**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9330	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0118	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0310**	**per day**
Average Daily Vapor Temperature Range	ΔTv	18.79	°R
Average Daily Vapor Pressure Range	ΔPv	0.0034	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0118	psia
Average Daily Liquid Surface Temperature	TLA	538.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.79**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.44**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00342**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01363	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.01021	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.22	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.83	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00318**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01355	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0103657	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	543.02	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	534.31	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**45.169**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.1901	86.18	130	0.00037	0.000007	0.012	**0.00057**
benzene	0.9596	78.11	130	0.00189	0.000037	0.012	**0.00315**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.012	**-**
toluene	11.5264	92.14	130	0.02273	0.000379	0.012	**0.03207**
ethylbenzene	1.5700	106.17	130	0.00310	0.000045	0.012	**0.00379**
xylenes	30.6692	106.17	130	0.06047	0.000875	0.012	**0.07405**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.012	**0.00E+00**
naphthalene	0.2533	128.17	130	4.99E-04	5.98E-06	0.012	**5.07E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.0611
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.9319
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0031
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5801
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1945
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1703
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0941
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0054

Monthly Calculations (continued) AUGUST

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**485.27**	lb/month
		2.43E-01	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**39.15**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.01140096	
Partially Insulated	P_{VA}	0.01144484	
Fully Insulated	P_{VA}	0.01085779	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.80	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**537.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.50**	°R
Fully Insulated: TLA = TB	**TLA**	**535.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.66**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.20**	**°R**
Fully Insulated; Tv = TB	**Tv**	**535.80**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.564E-04	
Partially Insulated	Wv	2.571E-04	
Fully Insulated	Wv	2.455E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**65.55**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**419.72**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9330	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0286**	**per day**
Average Daily Vapor Temperature Range	ΔTv	17.48	°R
Average Daily Vapor Pressure Range	ΔPv	0.0031	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Average Daily Liquid Surface Temperature	TLA	537.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**17.48**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.17**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00308**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01303	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00995	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00286**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01295	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0100946	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	541.54	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	533.46	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**43.201**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.1833	86.18	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.9238	78.11	130	0.00190	0.000036	0.011	**0.00317**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	11.0573	92.14	130	0.02279	0.000367	0.011	**0.03215**
ethylbenzene	1.5003	106.17	130	0.00309	0.000043	0.011	**0.00379**
xylenes	29.2966	106.17	130	0.06037	0.000843	0.011	**0.07392**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.011	**0.00E+00**
naphthalene	0.2394	128.17	130	4.93E-04	5.70E-06	0.011	**5.00E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.9779
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8760
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9730
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5614
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1875
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1641
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0904
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	**9**						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**47.56**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**378.71**	lb/month	Vapor Space Volume	Vv	292095.5	ft3
		1.89E-01	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**331.16**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Product Type	**Distillate Fuel Oil No.2**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9083	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.10**	lb/gal	Stock Vapor Density	Wv	0.0002	lb/ft3
Average Reid Vapor Pressure	RVP	**0.02**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**12.10**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0091	psia
				Vapor Space Outage	Hvo	23.80	ft
Tank design data							
Shell height	Hs	**45.00**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0264**	**per day**
Diameter	D	**125.00**	ft	Average Daily Vapor Temperature Range	ΔTv	16.09	°R
Throughput	Q	**13,125,383**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Turnovers	N	**40.45**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**Cone**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0091	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	530.21	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft				
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.09**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**14.74**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00233**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01034	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00801	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.23	°R
Not Insulated	P_{VA}	0.00911275		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.19	°R
Partially Insulated	P_{VA}	0.00914155					
Fully Insulated	P_{VA}	0.00875484		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00214**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01026	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0081279	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	533.99	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.62	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	528.95	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**292,095.51**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**530.21**	°R	Tank diameter	D	125.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**530.31**	°R	Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Fully Insulated: TLA = TB	**TLA**	**528.9**					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	45.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**531.24**	**°R**	Liquid Height	HL	22.50	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**531.67**	**°R**	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Fully Insulated; Tv = TB	**Tv**	**528.95**	**°R**				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	2.078E-04		Tank shell radius	Rs	62.50	ft
Partially Insulated	Wv	2.083E-04					
Fully Insulated	Wv	2.005E-04		**Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16**	**HRO**	**8.57**	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
				Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**33.593**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.1502	86.18	130	0.00040	0.000005	0.009	**0.00060**
benzene	0.7488	78.11	130	0.00198	0.000030	0.009	**0.00329**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.009	**-**
toluene	8.7632	92.14	130	0.02314	0.000298	0.009	**0.03265**
ethylbenzene	1.1597	106.17	130	0.00306	0.000034	0.009	**0.00375**
xylenes	22.5991	106.17	130	0.05967	0.000666	0.009	**0.07307**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.009	**0.00E+00**
naphthalene	0.1725	128.17	130	4.56E-04	4.21E-06	0.009	**4.62E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.4999
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.5573
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8018
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4557
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1484
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1297
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0704
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0038

Monthly Calculations (continued) **OCTOBER**

Tank No.	**9**						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**31.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**267.66**	lb/month	Vapor Space Volume	Vv	292095.5	ft3
		1.34E-01	ton/month	Stock Vapor Density	Wv	0.0001	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.024	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**236.66**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Product Type	**Distillate Fuel Oil No.2**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9330	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.10**	lb/gal	Stock Vapor Density	Wv	0.0001	lb/ft3
Average Reid Vapor Pressure	RVP	**0.02**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**12.10**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0062	psia
				Vapor Space Outage	Hvo	23.80	ft
Tank design data							
Shell height	Hs	**45.00**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0239**	**per day**
Diameter	D	**125.00**	ft	Average Daily Vapor Temperature Range	ΔTv	14.44	°R
Throughput	Q	**13,125,383**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0015	psi
Turnovers	N	**39.15**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**Cone**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0062	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	518.30	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft				
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**14.44**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**13.07**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00148**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00698	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00549	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.91	°R
Not Insulated	P_{VA}	0.00619435		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	514.69	°R
Partially Insulated	P_{VA}	0.00620929					
Fully Insulated	P_{VA}	0.00600781		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00135**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00691	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0055683	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	521.64	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	515.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.38	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**292,095.51**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.30**	°R	Tank diameter	D	125.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**518.37**	°R	Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Fully Insulated: TLA = TB	**TLA**	**517.4**					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	45.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.05**	**°R**	Liquid Height	HL	22.50	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**519.36**	**°R**	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Fully Insulated; Tv = TB	**Tv**	**517.38**	**°R**				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	1.446E-04		Tank shell radius	Rs	62.50	ft
Partially Insulated	Wv	1.448E-04					
Fully Insulated	Wv	1.407E-04		**Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16**	**HRO**	**8.57**	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
				Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**23.528**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.1153	86.18	130	0.00043	0.000004	0.006	**0.00065**
benzene	0.5634	78.11	130	0.00211	0.000022	0.006	**0.00350**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	6.3427	92.14	130	0.02370	0.000207	0.006	**0.03343**
ethylbenzene	0.8031	106.17	130	0.00300	0.000023	0.006	**0.00367**
xylenes	15.5981	106.17	130	0.05828	0.000442	0.006	**0.07136**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.1058	128.17	130	3.95E-04	2.48E-06	0.006	**4.01E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.8452
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1271
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5730
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3172
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0989
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0861
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0454
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0022

Monthly Calculations (continued) NOVEMBER

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**184.07**	lb/month
		9.20E-02	ton/month
Time Period		**November**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**40.45**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0043906	
Partially Insulated	P_{VA}	0.00439776	
Fully Insulated	P_{VA}	0.00430077	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	507.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**508.17**	°R
Fully Insulated: TLA = TB	**TLA**	**507.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**508.61**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**508.81**	**°R**
Fully Insulated; Tv = TB	**Tv**	**507.52**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.046E-04	
Partially Insulated	Wv	1.047E-04	
Fully Insulated	Wv	1.027E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**17.42**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**166.65**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9083	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0044	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0191**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.76	°R
Average Daily Vapor Pressure Range	ΔPv	0.0009	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0044	psia
Average Daily Liquid Surface Temperature	TLA	508.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.76**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.53**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00089**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00486	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00396	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.06	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.18	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00080**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00481	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0040141	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	510.80	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	505.54	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**16.002**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0851	86.18	130	0.00046	0.000003	0.004	**0.00070**
benzene	0.4086	78.11	130	0.00222	0.000016	0.004	**0.00369**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	**-**
toluene	4.4426	92.14	130	0.02414	0.000150	0.004	**0.03405**
ethylbenzene	0.5402	106.17	130	0.00293	0.000016	0.004	**0.00359**
xylenes	10.4618	106.17	130	0.05683	0.000306	0.004	**0.06959**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	**0.00E+00**
naphthalene	0.0638	128.17	130	3.46E-04	1.54E-06	0.004	**3.51E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.4043
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.8425
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4235
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2290
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0685
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0595
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0306
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) DECEMBER

Tank No.	9		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**135.76**	lb/month
		6.79E-02	ton/month
Time Period		**December**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**45.00**	ft
Diameter	D	**125.00**	ft
Throughput	Q	**13,125,383**	gal/month
Turnovers	N	**39.15**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**44.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**22.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003116053	
Partially Insulated	P_{VA}	0.003120355	
Fully Insulated	P_{VA}	0.003062014	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	497.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**498.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**498.41**	°R
Fully Insulated: TLA = TB	**TLA**	**497.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**498.77**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**498.94**	**°R**
Fully Insulated; Tv = TB	**Tv**	**497.88**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.568E-05	
Partially Insulated	Wv	7.576E-05	
Fully Insulated	Wv	7.450E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**11.87**	lb/month
Vapor Space Volume	Vv	292095.5	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.017	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**123.89**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,754,426	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.9330	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0031	psia
Vapor Space Outage	Hvo	23.80	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0174**	**per day**
Average Daily Vapor Temperature Range	ΔTv	10.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0006	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0031	psia
Average Daily Liquid Surface Temperature	TLA	498.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**10.69**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**9.53**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00060**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00343	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00283	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	495.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00053**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00340	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0028638	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	500.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.03	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**292,095.51**	ft3
Tank diameter	D	125.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	23.80	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**23.80**	ft
Tank shell height	Hs	45.00	ft
Liquid Height	HL	22.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	1.30	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**1.30**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	62.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**8.57**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	125.00	ft
Tank shell radius	Rs	62.50	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**11.639**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0673	86.18	130	0.00050	0.000002	0.003	**0.00075**
benzene	0.3169	78.11	130	0.00233	0.000012	0.003	**0.00389**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	3.3277	92.14	130	0.02451	0.000108	0.003	**0.03458**
ethylbenzene	0.3882	106.17	130	0.00286	0.000011	0.003	**0.00350**
xylenes	7.4977	106.17	130	0.05523	0.000211	0.003	**0.06762**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0410	128.17	130	3.02E-04	9.55E-07	0.003	**3.06E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.0674
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6288
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3125
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1650
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0474
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0410
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0206
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009

FRT TANK EMISSION CALCULATION

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	**LT**	**126.95**	lb/year
Total Losses, heated (Eq.1-1: LT = LS+LW)	**LT**	**669.12**	lb/year
	Time Period	**Annual**	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	**32**	Lb/lb-mole
Average organic liquid density	WL	**7.30**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**36,690,432**	gal/yr
Turnovers	N	**46.88**	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.005755914	
Partially Insulated	P_{VA}	0.005773709	
Fully Insulated, unheated	P_{VA}	0.005534669	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA): Eq. 1-30 TAA = ((TAX+TAI	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	507.30	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	514.92	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**516.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**516.19**	°R
Fully Insulated, unheated: TLA = TB	**TLA**	**514.9**	°R
Fully Insulated: TLA = TB	**TLA**	**564.7**	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**517.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.45**	**°R**
Fully Insulated; unheated Tv = TB	**Tv**	**514.92**	**°R**
Fully Insulated; heated Tv = TB	**Tv**	**564.7**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.324E-05	
Partially Insulated	Wv	3.332E-05	
Fully Insulated, unheated	Wv	3.209E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/yr
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	**Ls**	**137.31**	lb/yr
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	60.0000	ft
Vapor Space Outage	Hvo	20.125	ft
Vented Vapor Saturation Factor	Ks	0.97	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**126.95**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	4,904,288	ft3/yr
Working Loss Turnover Factor	KN	0.8066	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**531.81**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	4,904,288	ft3/yr
Working Loss Turnover Factor	KN	0.8066	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	**Ks**	**0.97**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	**KE**	**0.0505**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0055	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	**KE**	**0.0000**	**per day**
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0055	psia
Average Daily Liquid Surface Temperature	TLA	514.92	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.54**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.20**	°R
Fully Insulated, heated	**ΔTv**	**30.00**	°R
Fully Insulated, not heated	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00150**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00655	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00505	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.21	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00137**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00650	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 using	PVN	0.0051236	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	512.64	°R
Fully Insulated, unheated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.02**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 using	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel

Total HAP Emissions =	126.952	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	32	0.00000	0.000000	0.006	-
benzene	0.0000	78.11	32	0.00000	0.000000	0.006	-
2,2,4 TMP	0	114.23	32	0	0.000000	0.006	0
toluene	0.0000	92.14	32	0.00000	0.000000	0.006	-
ethylbenzene	0.0000	106.17	32	0.00000	0.000000	0.006	-
xylenes	0.0000	106.17	32	0.00000	0.000000	0.006	-
cumene	0.0000	120.19	32	0.00E+00	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0000	128.17	32	0.00E+00	0.00E+00	0.006	**0.00E+00**
methanol	126.9519	32.04	32	1.00E+00	5.53E-03	0.006	**1.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	1.6880
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.0250
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.5192
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.2852
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0877
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0763
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0400
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0019
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	1.2721

Speciation, Heated 0

HAPS Speciation	lb/yr
Product	biodiesel

Total HAP Emissions =	669.120	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	114.23	32	0	0.000000	0.025	0
toluene	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
naphthalene	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
methanol	669.1198	32.04	32	1.00E+00	2.54E-02	0.025	**1.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - JANUARY

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses, unheated (Eq.1-1: LT = LS+LW)	**LT**	**5.25**	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	**LT**	**52.34**	lb/month
Time Period		**January**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Biodiesel**	
Vapor Molecular weight	Mv	**32**	Lb/lb-mole
Average organic liquid density	WL	**7.30**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**60.00**	ft
Diameter	D	**39.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**59.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**30.00**	ft
Tank Insulation (pick from drop down list)		**Fully Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.002645605	
Partially Insulated	P_{VA}	0.002649869	
Fully Insulated, unheated	P_{VA}	0.00259212	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA): Eq. 1-30 TAA = ((TAX+TAI	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	486.80	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	493.29	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**493.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**493.89**	°R
Fully Insulated, unheated: TLA = TB	**TLA**	**493.3**	°R
Fully Insulated: TLA = TB	**TLA**	**564.7**	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**494.31**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**494.50**	**°R**
Fully Insulated; unheated Tv = TB	**Tv**	**493.29**	**°R**
Fully Insulated; heated Tv = TB	**Tv**	**564.7**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.598E-05	
Partially Insulated	Wv	1.600E-05	
Fully Insulated, unheated	Wv	1.569E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	**Ls**	**7.35**	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**5.25**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**44.99**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	**Ks**	**0.96**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	**KE**	**0.0505**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0026	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	**KE**	**0.0000**	**per day**
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0026	psia
Average Daily Liquid Surface Temperature	TLA	493.29	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.41**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.20**	°R
Fully Insulated, heated	**ΔTv**	**30.00**	°R
Fully Insulated, not heated	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00055**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00293	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00238	psia
Average daily max. liquid surface temp.: Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	496.70	°R
Average daily min. liquid surface temp.: Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00049**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00291	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0024131	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	496.44	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	491.34	°R
Fully Insulated, unheated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.02**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**36,323.02**	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**30.41**	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.41**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	**HRO**	**2.68**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	**5.251**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.003	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.003	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.003	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.003	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.003	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.003	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.003	**0.00E+00**
methanol	5.2507	0.0000	5.2507	32.04	32	1.00E+00	2.59E-03	0.003	**1.00E+00**

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	0.9204
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	0.5368
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.2651
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.1383
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0388
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0336
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0166
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0007
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	0.6190

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	**52.337**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
methanol	52.3369	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	**1.00E+00**

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - FEBRUARY

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses, unheated (Eq.1-1: LT = LS+LW)	**LT**	**5.12**	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	**LT**	**48.16**	lb/month
Time Period		**February**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Biodiesel**	
Vapor Molecular weight	Mv	**32**	Lb/lb-mole
Average organic liquid density	WL	**7.30**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**60.00**	ft
Diameter	D	**39.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**50.93**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**59.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**30.00**	ft
Tank Insulation (pick from drop down list)		**Fully Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.002831262	
Partially Insulated	P_{VA}	0.002837896	
Fully Insulated, unheated	P_{VA}	0.002748418	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA): Eq. 1-30 TAA = ((TAX+TAI	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	487.80	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	494.90	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.78**	°R
Fully Insulated, unheated: TLA = TB	**TLA**	**494.9**	°R
Fully Insulated: TLA = TB	**TLA**	**564.7**	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.66**	**°R**
Fully Insulated; unheated Tv = TB	**Tv**	**494.90**	**°R**
Fully Insulated; heated Tv = TB	**Tv**	**564.7**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.703E-05	
Partially Insulated	Wv	1.706E-05	
Fully Insulated, unheated	Wv	1.658E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	**Ls**	**6.63**	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**5.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7558	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**41.52**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7558	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	**Ks**	**0.96**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	**KE**	**0.0505**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0027	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	**KE**	**0.0000**	**per day**
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0027	psia
Average Daily Liquid Surface Temperature	TLA	494.90	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**13.34**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.05**	°R
Fully Insulated, heated	**ΔTv**	**30.00**	°R
Fully Insulated, not heated	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00069**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00319	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00251	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	499.05	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.38	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00062**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00316	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0025428	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	492.77	°R
Fully Insulated, unheated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.02**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**36,323.02**	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**30.41**	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.41**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	**HRO**	**2.68**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	5.122
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.003	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.003	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.003	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.003	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.003	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.003	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.003	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.003	0.00E+00
methanol	5.1215	0.0000	5.1215	32.04	32	1.00E+00	2.75E-03	0.003	1.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	0.9649
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	0.5645
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.2794
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.1463
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0414
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0358
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0178
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0007
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	0.6546

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	48.158
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	48.1582	6.6346	41.5236	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - MARCH

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	7.05	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	52.34	lb/month
Time Period		March	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1175.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	46.00	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003685601	
Partially Insulated	P_{VA}	0.003697046	
Fully Insulated, unheated	P_{VA}	0.003543322	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAI…	TAA	501.10	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	494.30	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	501.98	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	503.10	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	503.19	°R
Fully Insulated, unheated: TLA = TB	TLA	502.0	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	504.01	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	504.39	°R
Fully Insulated; unheated Tv = TB	Tv	501.98	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.183E-05	
Partially Insulated	Wv	2.188E-05	
Fully Insulated, unheated	Wv	2.108E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * Ke * (π/4 · D²) * Hvo * Ks * Wv	Ls	7.35	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	7.05	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Losses Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	44.99	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Losses Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo)	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P…	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H…	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0035	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/…	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0035	psia
Average Daily Liquid Surface Temperature	TLA	501.98	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	15.40	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	14.04	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00100	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp(…	PVX	0.00422	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25, PVN = exp(…	PVN	0.00322	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.95	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00091	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin…	PVX	0.00418	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin…	PVN	0.0032649	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2…	TLX	506.69	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2…	TLN	499.68	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin…	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin…	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16…	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	7.053
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i (Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV)	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$ (Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA)	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.004	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.004	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.004	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.004	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.004	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.004	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.004	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.004	0.00E+00
methanol	7.0533	0.0000	7.0533	32.04	32	1.00E+00	3.54E-03	0.004	1.00E+00

Individual HAPS	Z_{Li} (Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi)	M_L	M_i	X_i	A (Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C))))	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	1.1833
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	0.7019
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.3503
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.1867
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0544
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0472
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0239
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0010
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	0.8338

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	52.337
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i (Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV)	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$ (Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA)	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	52.3369	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Individual HAPS	Z_{Li} (Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi)	M_L	M_i	X_i	A (Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C))))	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - APRIL

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	9.55	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	50.94	lb/month
Time Period		April	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1516.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	47.53	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.005271517	
Partially Insulated	P_{VA}	0.005291799	
Fully Insulated, unheated	P_{VA}	0.005020492	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	510.90	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	503.60	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	512.04	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.48	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.59	°R
Fully Insulated, unheated: TLA = TB	TLA	512.0	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.65	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.14	°R
Fully Insulated; unheated Tv = TB	Tv	512.04	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.058E-05	
Partially Insulated	Wv	3.067E-05	
Fully Insulated, unheated	Wv	2.928E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	Ls	7.11	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	9.55	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	43.84	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0050	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0050	psia
Average Daily Liquid Surface Temperature	TLA	512.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	17.80	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	16.34	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00159	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00612	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00453	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	517.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00146	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00607	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0046049	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	517.68	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	509.51	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	9.546
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.005	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.005	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.005	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.005	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.005	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.005	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.005	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.005	0.00E+00
methanol	9.5457	0.0000	9.5457	32.04	32	1.00E+00	5.02E-03	0.005	1.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	1.5623
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	0.9439
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.4766
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.2601
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0791
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0687
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0357
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0017
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	1.1601

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	50.944
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	50.9440	7.1085	43.8355	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - MAY

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	13.16	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	52.34	lb/month
Time Period		May	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1760.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	psia ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	46.00	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.007251134	
Partially Insulated	P_{VA}	0.00728235	
Fully Insulated, unheated	P_{VA}	0.006865828	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TA…	TAA	520.10	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	512.70	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 α I	TB	521.42	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	523.09	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	523.22	°R
Fully Insulated, unheated: TLA = TB	TLA	521.4	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	524.46	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	525.03	°R
Fully Insulated; unheated Tv = TB	Tv	521.42	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.128E-05	
Partially Insulated	Wv	4.141E-05	
Fully Insulated, unheated	Wv	3.931E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * KE * (π/4 * D²) * HVO * Ks * Wv	Ls	7.35	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	13.16	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00004	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	44.99	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0069	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0069	psia
Average Daily Liquid Surface Temperature	TLA	521.42	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	19.16	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	17.68	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00227	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00846	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00620	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	527.88	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	518.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00210	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00840	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0062992	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	527.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	518.80	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	13.157

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$; Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.007	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.007	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.007	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.007	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.007	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.007	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.007	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.007	0.00E+00
methanol	13.1575	0.0000	13.1575	32.04	32	1.00E+00	6.87E-03	0.007	1.00E+00

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	2.0014
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.2289
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.6269
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.3495
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.1102
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0961
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0511
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0026
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	1.5586

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	52.337

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$; Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	52.3369	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - JUNE

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses, unheated (Eq.1-1: LT = LS+LW)	**LT**	**17.27**	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	**LT**	**50.94**	lb/month
	Time Period	**June**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Biodiesel**	
Vapor Molecular weight	Mv	**32**	Lb/lb-mole
Average organic liquid density	WL	**7.30**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**60.00**	ft
Diameter	D	**39.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**47.53**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**59.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**30.00**	ft
Liquid height (assume 1/2 Hs)	HL	**30.00**	ft
Tank Insulation (pick from drop down list)		**Fully Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.009975052	
Partially Insulated	P_{VA}	0.010019646	
Fully Insulated, unheated	P_{VA}	0.009425127	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TA	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	522.80	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	531.27	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.08**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.22**	°R
Fully Insulated, unheated: TLA = TB	**TLA**	**531.3**	°R
Fully Insulated: TLA = TB	**TLA**	**564.7**	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**534.55**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**535.16**	**°R**
Fully Insulated; unheated Tv = TB	**Tv**	**531.27**	**°R**
Fully Insulated; heated Tv = TB	**Tv**	**564.7**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.572E-05	
Partially Insulated	Wv	5.590E-05	
Fully Insulated, unheated	Wv	5.297E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	**Ls**	**7.11**	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**17.27**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00005	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**43.84**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	**Ks**	**0.96**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	**KE**	**0.0505**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0094	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	**KE**	**0.0000**	**per day**
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0094	psia
Average Daily Liquid Surface Temperature	TLA	531.27	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.36**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.95**	°R
Fully Insulated, heated	**ΔTv**	**30.00**	°R
Fully Insulated, not heated	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00303**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.01159	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00856	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	537.92	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.24	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00282**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.01152	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0086952	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	537.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	528.73	°R
Fully Insulated, unheated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.02**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**36,323.02**	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**30.41**	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.41**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	**HRO**	**2.68**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	17.272

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$ — Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV — Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.009	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.009	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.009	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.009	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.009	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.009	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.009	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.009	0.00E+00
methanol	17.2716	0.0000	17.2716	32.04	32	1.00E+00	9.43E-03	0.009	1.00E+00

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi — Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	2.5667
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.6017
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.8256
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.4702
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.1538
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.1344
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0731
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0040
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	2.0983

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	50.944

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$ — Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV — Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	50.9440	7.1085	43.8355	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi — Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - JULY

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses, unheated (Eq.1-1: LT = LS+LW)	**LT**	**20.82**	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	**LT**	**52.34**	lb/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Biodiesel**	
Vapor Molecular weight	Mv	**32**	Lb/lb-mole
Average organic liquid density	WL	**7.30**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**60.00**	ft
Diameter	D	**39.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**59.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**30.00**	ft
Liquid height (assume 1/2 Hs)	HL	**30.00**	ft
Tank Insulation (pick from drop down list)		**Fully Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.011811804	
Partially Insulated	P_{VA}	0.011862698	
Fully Insulated, unheated	P_{VA}	0.011183566	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAI	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	528.60	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	536.75	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.52**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**538.66**	°R
Fully Insulated, unheated: TLA = TB	**TLA**	**536.8**	°R
Fully Insulated: TLA = TB	**TLA**	**564.7**	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.97**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.58**	**°R**
Fully Insulated; unheated Tv = TB	**Tv**	**536.75**	**°R**
Fully Insulated; heated Tv = TB	**Tv**	**564.7**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.531E-05	
Partially Insulated	Wv	6.552E-05	
Fully Insulated, unheated	Wv	6.221E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.98	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	**Ls**	**7.35**	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**20.82**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00006	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**44.99**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	**Ks**	**0.96**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	**KE**	**0.0505**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	**Ks**	**0.98**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0112	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	**KE**	**0.0000**	**per day**
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0112	psia
Average Daily Liquid Surface Temperature	TLA	536.75	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.79**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.44**	°R
Fully Insulated, heated	**ΔTv**	**30.00**	°R
Fully Insulated, not heated	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00342**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[/	PVX	0.01363	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.01021	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.22	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.83	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00318**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.01355	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0103657	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.02	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	534.31	°R
Fully Insulated, unheated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.02**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**36,323.02**	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**30.41**	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.41**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	**HRO**	**2.68**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	20.820
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.011	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.011	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.011	**0**
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.011	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.011	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.011	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.011	**0.00E+00**
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.011	**0.00E+00**
methanol	20.8197	0.0000	20.8197	32.04	32	1.00E+00	1.12E-02	0.011	**1.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	2.9335
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.8463
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.9570
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.5514
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.1838
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.1608
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0885
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0050
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	2.4623

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	52.337
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	**0**
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
methanol	52.3369	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	**1.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - AUGUST

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	20.25	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	52.34	lb/month
Time Period		August	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1661.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	46.00	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.011400962	
Partially Insulated	P_{VA}	0.011444844	
Fully Insulated, unheated	P_{VA}	0.010857795	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TA	TAA	534.55	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	528.00	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	535.80	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	537.37	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	537.50	°R
Fully Insulated, unheated: TLA = TB	TLA	535.8	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	538.66	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	539.20	°R
Fully Insulated; unheated Tv = TB	Tv	535.80	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.319E-05	
Partially Insulated	Wv	6.337E-05	
Fully Insulated, unheated	Wv	6.051E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.98	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	Ls	7.35	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	20.25	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00006	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	44.99	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	Ks	0.98	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0109	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0109	psia
Average Daily Liquid Surface Temperature	TLA	535.80	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	17.48	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	16.17	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00308	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.01303	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00995	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00286	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.01295	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0100946	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	541.54	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	533.46	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	20.249
Eq. 40-2 $L_{Ti} = Z_{Li}(L_T)$	

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.011	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.011	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.011	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.011	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.011	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.011	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.011	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.011	0.00E+00
methanol	20.2493	0.0000	20.2493	32.04	32	1.00E+00	1.09E-02	0.011	1.00E+00

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	2.8667
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.8016
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.9329
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.5365
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.1782
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.1559
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0856
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0048
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	2.3952

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	52.337
Eq. 40-2 $L_{Ti} = Z_{Li}(L_T)$	

Vapor Weight Concentrations: Eq. 40-6 ZVi = yiMi / MV; Vapor Mole Fraction: Eq. 40-5 yi = Pi / PVA

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	52.3369	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Liquid Mole Fraction: Eq. 40-4 xi = (ZLiML)/Mi; Component Vapor Pressure: PVAi=(0.019337)10^(A-(B/(TLA+C)))

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - SEPTEMBER

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	16.11	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	50.94	lb/month
Time Period		September	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1328.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	47.53	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.009112755	
Partially Insulated	P_{VA}	0.009141552	
Fully Insulated, unheated	P_{VA}	0.008754845	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAI	TAA	527.95	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	521.20	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	528.95	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	530.21	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	530.31	°R
Fully Insulated, unheated: TLA = TB	TLA	528.9	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	531.24	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	531.67	°R
Fully Insulated; unheated Tv = TB	Tv	528.95	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.122E-05	
Partially Insulated	Wv	5.134E-05	
Fully Insulated, unheated	Wv	4.942E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	Ls	7.11	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	16.11	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00005	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	43.84	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0088	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0088	psia
Average Daily Liquid Surface Temperature	TLA	528.95	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.09	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	14.74	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00233	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.01034	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00801	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.23	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.19	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00214	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.01026	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 using	PVN	0.0081279	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.99	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	526.62	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 using	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	16.114
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
				Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.009	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.009	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.009	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.009	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.009	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.009	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.009	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.009	0.00E+00
methanol	16.1139	0.0000	16.1139	32.04	32	1.00E+00	8.75E-03	0.009	1.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	2.4227
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.5062
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.7745
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.4389
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.1423
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.1243
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0673
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0036
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	1.9582

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	50.944
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
				Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	50.9440	7.1085	43.8355	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - OCTOBER

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses, unheated (Eq.1-1: LT = LS+LW)	**LT**	**11.60**	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	**LT**	**52.34**	lb/month
Time Period		**October**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Biodiesel**	
Vapor Molecular weight	Mv	**32**	Lb/lb-mole
Average organic liquid density	WL	**7.30**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**60.00**	ft
Diameter	D	**39.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**59.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**30.00**	ft
Liquid height (assume 1/2 Hs)	HL	**30.00**	ft
Tank Insulation (pick from drop down list)		**Fully Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.006194351	
Partially Insulated	P_{VA}	0.006209293	
Fully Insulated, unheated	P_{VA}	0.006007814	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAI	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	509.80	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	517.38	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.30**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**518.37**	°R
Fully Insulated, unheated: TLA = TB	**TLA**	**517.4**	°R
Fully Insulated: TLA = TB	**TLA**	**564.7**	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**519.36**	**°R**
Fully Insulated; unheated Tv = TB	**Tv**	**517.38**	**°R**
Fully Insulated; heated Tv = TB	**Tv**	**564.7**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.563E-05	
Partially Insulated	Wv	3.570E-05	
Fully Insulated, unheated	Wv	3.467E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * K_E * (π/4 * D^2) * H_{VO} * K_s * W_v	**Ls**	**7.35**	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**11.60**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**44.99**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	**Ks**	**0.96**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	**KE**	**0.0505**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0060	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	**KE**	**0.0000**	**per day**
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0060	psia
Average Daily Liquid Surface Temperature	TLA	517.38	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**14.44**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.07**	°R
Fully Insulated, heated	**ΔTv**	**30.00**	°R
Fully Insulated, not heated	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00148**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	0.00698	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[A	PVN	0.00549	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.91	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	514.69	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00135**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00691	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0055683	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	521.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	515.10	°R
Fully Insulated, unheated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.02**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usinc	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**36,323.02**	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**30.41**	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.41**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.166	**HRO**	**2.68**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	11.603
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**Standing, lb/yr**	**Working, lb/yr**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAI}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.006	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.006	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.006	**0**
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.006	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.006	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.006	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.006	**0.00E+00**
methanol	11.6032	0.0000	11.6032	32.04	32	1.00E+00	6.01E-03	0.006	**1.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	1.8012
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	1.0984
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.5579
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.3082
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0957
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0833
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0439
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0021
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	1.3744

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	52.337
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**Standing, lb/yr**	**Working, lb/yr**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAI}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	**0**
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	**0.00E+00**
methanol	52.3369	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	**1.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - NOVEMBER

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	8.25	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	50.94	lb/month
	Time Period	November	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	630.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	47.53	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0043906	
Partially Insulated	P_{VA}	0.004397762	
Fully Insulated, unheated	P_{VA}	0.004300772	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TA	TAA	507.05	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	500.90	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	507.52	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	508.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	508.17	°R
Fully Insulated, unheated: TLA = TB	TLA	507.5	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	508.61	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	508.81	°R
Fully Insulated; unheated Tv = TB	Tv	507.52	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.577E-05	
Partially Insulated	Wv	2.581E-05	
Fully Insulated, unheated	Wv	2.530E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Standing Losses, Heated: Eq 1-4 365 * KE * (π/4 · D²) * HVO * KS * WV	Ls	7.11	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	8.25	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	43.84	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo)	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0043	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0043	psia
Average Daily Liquid Surface Temperature	TLA	507.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	11.76	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	10.53	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00089	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp(	PVX	0.00486	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp(	PVN	0.00396	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.06	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.18	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00080	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00481	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0040141	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	510.80	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	505.54	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((PI / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	8.250
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
				Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.004	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.004	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.004	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.004	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.004	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.004	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.004	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.004	0.00E+00
methanol	8.2500	0.0000	8.2500	32.04	32	1.00E+00	4.30E-03	0.004	1.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	1.3814
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	0.8278
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.4158
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.2245
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0670
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0582
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0299
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0014
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	1.0021

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	50.944
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
				Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	50.9440	7.1085	43.8355	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

Monthly Calculations - DECEMBER

Tank No.	8		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses, unheated (Eq.1-1: LT = LS+LW)	LT	6.15	lb/month
Total Losses, heated (Eq.1-1: LT = LS+LW)	LT	52.34	lb/month
Time Period		December	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	513.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Biodiesel	
Vapor Molecular weight	Mv	32	Lb/lb-mole
Average organic liquid density	WL	7.30	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B	B	8907.0	°R
Tank design data			
Shell height	Hs	60.00	ft
Diameter	D	39.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	46.00	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	59.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	30.00	ft
Liquid height (assume 1/2 Hs)	HL	30.00	ft
Tank Insulation (pick from drop down list)		Fully Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003116053	
Partially Insulated	P_{VA}	0.003120355	
Fully Insulated, unheated	P_{VA}	0.003062014	
Fully Insulated, heated	P_{VA}	0.025426158	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TA	TAA	497.50	°R
Average daily maximum ambient temperature, Table 7.1-7, unheated	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7, unheated	TAN	491.70	°R
Liquid Bulk Temperature; unheated, Eq 1-31: TB = TAA + 0.003 αs I	TB	497.88	°R
Liquid Bulk Temperature; temperature of heated product	TB	564.70	°R
Maximum heated bulk liquid temperature (from process knowledge)		120.00	°F
Minimum heated bulk liquid temperature (from process knowledge)		90.00	°F
Maximum heated bulk liquid temperature (from process knowledge)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process knowledge)	TBN	549.70	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	498.37	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	498.41	°R
Fully Insulated, unheated: TLA = TB	TLA	497.9	°R
Fully Insulated: TLA = TB	TLA	564.7	°R
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	498.77	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	498.94	°R
Fully Insulated; unheated Tv = TB	Tv	497.88	°R
Fully Insulated; heated Tv = TB	Tv	564.7	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.865E-05	
Partially Insulated	Wv	1.867E-05	
Fully Insulated, unheated	Wv	1.836E-05	
Fully Insulated, heated	Wv	1.344E-04	

Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses, Unheated; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	36323.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.000	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Standing Losses, Heated: Eq 1-4 365 * KE * (π/4 * D²) * HVO * KS * WV	Ls	7.35	lb/month
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.051	per day
Diameter	D	39.0000	ft
Vapor Space Outage	Hvo	30.406	ft
Vented Vapor Saturation Factor	Ks	0.96	NA
Stock Vapor Density	Wv	0.0001	lb/ft3
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Unheated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	6.15	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.00002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Working Losses; Heated, Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	44.99	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Heated, Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo	Ks	0.96	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Heated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(P	KE	0.0505	per day
Average Daily Vapor Temperature Range	ΔTv	30.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0217	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0254	psia
Average Daily Liquid Surface Temperature	TLA	564.70	°R
Atmospheric Pressure	P_A	14.68	psia
Vented Vapor Saturation Factor; Unheated, Eq. 1-21, Ks = 1/(1+0.053*PvA*H	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0031	psia
Vapor Space Outage	Hvo	30.41	ft
Vapor Space Expansion Factor, Unheated (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/	KE	0.0000	per day
Average Daily Vapor Temperature Range	ΔTv	0.00	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0031	psia
Average Daily Liquid Surface Temperature	TLA	497.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	10.69	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	9.53	°R
Fully Insulated, heated	ΔTv	30.00	°R
Fully Insulated, not heated	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00060	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp(	PVX	0.00343	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25, PVN = exp(	PVN	0.00283	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	495.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00053	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.00340	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0028638	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	500.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.03	°R
Fully Insulated, unheated (ΔPv = 0)	ΔPv	0.00	psia
Fully Insulated, heated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.02	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usin	PVX	0.03824	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	0.0165332	psia
Maximum heated bulk liquid temperature (from process setpoints)	TBX	579.70	°R
Minimum heated bulk liquid temperature (from process setpoints)	TBN	549.70	°R
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	36,323.02	ft3
Tank diameter	D	39.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	30.41	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	30.41	ft
Tank shell height	Hs	60.00	ft
Liquid Height	HL	30.00	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.41	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.41	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	19.50	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	2.68	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	39.00	ft
Tank shell radius	Rs	19.50	ft

Speciation, Unheated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	6.145
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.003	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.003	-
2,2,4 TMP	0	0	0	114.23	32	0	0.000000	0.003	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.003	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.003	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.003	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.003	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.003	0.00E+00
methanol	6.1453	0.0000	6.1453	32.04	32	1.00E+00	3.06E-03	0.003	1.00E+00

	Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	1.0525
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	0.6194
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	0.3076
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	0.1623
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.0465
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.0403
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.0202
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0008
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	0.7257

Speciation, Heated

HAPS Speciation	lb/yr
Product	biodiesel
Total HAP Emissions =	6.145
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

				Vapor Weight Concentrations, Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction, Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/yr)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	0.0000	0.0000	86.18	32	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	32	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0	0	114.23	32	0	0.000000	0.025	0
toluene	0.0000	0.0000	0.0000	92.14	32	0.00000	0.000000	0.025	-
ethylbenzene	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
xylenes	0.0000	0.0000	0.0000	106.17	32	0.00000	0.000000	0.025	-
cumene	0.0000	0.0000	0.0000	120.19	32	0.00E+00	0.00E+00	0.025	0.00E+00
naphthalene	0.0000	0.0000	0.0000	128.17	32	0.00E+00	0.00E+00	0.025	0.00E+00
methanol	6.1453	7.3454	44.9915	32.04	32	1.00E+00	2.54E-02	0.025	1.00E+00

	Liquid Mole Fraction, Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	277.4	86.18	0.00000	6.878	1171.5	224.37	5.5293
benzene	0.0000000	277.4	78.11	0.00000	6.906	1211	220.79	3.6222
2,2,4 TMP	0.0000000	277.4	114.23	0.00000	6.812	1257.8	220.74	1.9275
toluene	0.0000000	277.4	92.14	0.00000	7.017	1377.6	222.64	1.1738
ethylbenzene	0.0000000	277.4	106.17	0.00000	6.95	1419.3	212.61	0.4271
xylenes	0.0000000	277.4	106.17	0.00000	7.009	1462.3	215.11	0.3769
cumene	0.0000000	277.4	120.19	0.00000	6.929	1455.8	207.2	0.2187
naphthalene	0.0000000	277.4	128.17	0.00000	7.146	1831.6	211.82	0.0150
methanol	0.0020000	277.4	32.04	0.01732	8.079	1581.3	239.65	5.2768

FRT TANK EMISSION CALCULATION

Tank No.	8		Tank type: Fixed Roof Tank		Date	11/15/21

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**606.19**	lb/year
		0.30	ton/year
Time Period		**Annual**	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Distillate Fuel Oil No.2	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**36,690,432**	gal/yr
Turnovers	N	**46.88**	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.005755914	
Partially Insulated	P_{VA}	0.005773709	
Fully Insulated	P_{VA}	0.005534669	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	514.92	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**516.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**516.19**	°R
Fully Insulated: TLA = TB	**TLA**	**514.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**517.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.45**	**°R**
Fully Insulated; Tv = TB	**Tv**	**514.92**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.349E-04	
Partially Insulated	Wv	1.352E-04	
Fully Insulated	Wv	1.302E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**72.70**	lb/yr
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**533.49**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	4,904,288	ft3/yr
Working Loss Turnover Factor	KN	0.8066	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0058	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0261**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.54	°R
Average Daily Vapor Pressure Range	ΔPv	0.0015	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0058	psia
Average Daily Liquid Surface Temperature	TLA	516.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.54**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00150**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00655	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00505	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.21	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00137**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00650	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0051236	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	519.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	512.64	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	lb/yr
Product	Diesel
Total HAP Emissions =	**53.174**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.2652	86.18	130	0.00044	0.000004	0.006	**0.00066**
benzene	1.2909	78.11	130	0.00213	0.000020	0.006	**0.00354**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	14.4246	92.14	130	0.02380	0.000193	0.006	**0.03357**
ethylbenzene	1.8109	106.17	130	0.00299	0.000021	0.006	**0.00366**
xylenes	35.1495	106.17	130	0.05798	0.000409	0.006	**0.07100**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.2331	128.17	130	3.84E-04	2.24E-06	0.006	**3.90E-04**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.7412
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.0595
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5373
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2960
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0915
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0796
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0418
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0020

CLEANING CALCULATIONS	Symbol		Units
Number of Cleanings		**0**	events
Total Cleaning Losses (LFV = LP+LCV+ LS)	**LFV**	**-**	lb/event
		0.0000	tpy
Month the cleaning occurred:		**July**	
Product Type		**Distillate Fuel Oil No.2**	
Calibration Gas		**Propane (C3)**	
Duration of the continued forced ventilation	n_{CV}	1	days
Number of Days tank is idle before cleaning	nd	3	days
Height of tank shell	hs	**39.00**	ft
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
LEL of Calibration Gas		2.1	%
Average vapor concentration by volume during continued forced	C_V	0.0021	
Calibration Gas Molecular Weight	M_{CG}	44.1	lb/lb-mole
Vapor Space Purge Losses (Fixed Roof)			
Eq. 4-2 LP=(PVA*VV/R*TV)*MV*S	L_P	11.241	
Saturation Factor S = $(0.5n_d + 1) / 6$; must be 0.25 ≤ S≤0.5	S	**0.417**	
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR
Average temperature of the vapor space = average ambient tem	T_V (T_{AA})	535.35	°R
True vapor pressure of the exposed volatile material in the tank	P_{VA}	0.011	
Volume of vapor space	V_V	111,330.19	
Stock vapor molecular weight	M_V	130.00	lb/lb-mol
Continued Forced Ventiliation Emissions (use LCV max for PTE)			
$L_{CV} = 60*Qv*n_{CV}*tv*C_V*(P_a*M_{CG})/(R*T_V)$	L_{CV}	1,135.92	
Average ventilation rate during continued forced ventilation	Q_V	10000	ft^3/min
Duration of continued forced ventilation, days	n_{CV}	1	days
Daily period of forced ventilation	t_V	8	hrs/day
Average vapor concentration by volume during continued forced	C_V	0.0021	
Atmospheric pressure at the tank location	Pa	14.68	
Calibration gas molecular weight	M_{CG}	44.1	
Average temperature of vapor below the floating roof = average	T_V (T_{AA})	535.35	
Prior Stock Remains = LCV max			
L_{CV} max = $5.9*D^2*(hl)*Wl$		37701	
Cvmax = P_{VA}/Pa		0.000729465	
Average Ambient Temperature during Month TAA = (TAX+TA	**TAA**	**535.35**	**°R**
Average daily monthly maximum ambient temperature, Table 7.	TAX	542.1	°R
Average daily montlhy minimum ambient temperature, Table 7.	TAN	528.6	°R
Product Vapor Pressure			
P_{VA} = exp(A-(B/TAA)) (modified Eq 1-25 where TLA= TAA)	P_{VA}	**0.011**	**psia**
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B	B	**8907.0**	°R
Average ambient temperature during month	TAA	535.4	°R
Vapor Space Volume $V_V = h_{vo}((PI)D^2/4)$	V_V	**111,330.19**	ft^3
Fixed roof tank vapor space outage Eq 4-4	h_{vo}	39.38	ft
Standing Idle Losses (pro-rated) Eq. 3-7 $L_{SL} = n_d*KE*((P_{VA}*V_V)$	**LSL**	**2.46**	**lb**
Number of days the tank stays idle	n_d	3	
Hours per day the tank stays idle, (used to pro-rate purge calc per 7.1.3.3)		16	
Vapor space expansion factor, per day	K_E	0.0310	
True vapor pressure of stock liquid (avg. ambient temp. of mont	P_{VA}	0.011	psia
Volume of the vapor space	V_V	111330.19	ft^3
Ideal gas constant	R	10.731	(psia-ft3)/(lb-mole degR)
Average vapor temperature (assumed to be equal to ground tem	T_V (T_{AA})	535.35	°R
Stock vapor molecular weight	M_V	130	lb/lb-mol
Saturation factor Ks = 1/(1+0.053*PVA*HV)	K_S	0.98	

Additional Purge Calculations

Day 2	Day 3
6.744	6.744
0.250	**0.250**
10.731	10.731
535.35	535.35
0.011	0.011
111,330.19	111,330.19
130	130

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Diesel						
Total HAP Emissions =	**0.000**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/event)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	130	0.00038	0.000006	0.011	**0.00058**
benzene	0.0000	78.11	130	0.00192	0.000034	0.011	**0.00320**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.0000	92.14	130	0.02289	0.000346	0.011	**0.03229**
ethylbenzene	0.0000	106.17	130	0.00308	0.000040	0.011	**0.00378**
xylenes	0.0000	106.17	130	0.06019	0.000789	0.011	**0.07369**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.011	**-**
naphthalene	0.0000	128.17	130	4.83E-04	5.24E-06	0.011	**0.00049**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.8359
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.7810
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9218
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5296
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1757
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1537
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0843
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0047

Monthly Calculations - JANUARY

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**23.87**	lb/month
		1.19E-02	ton/month
Time Period		**January**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00264561	
Partially Insulated	P_{VA}	0.00264987	
Fully Insulated	P_{VA}	0.00259212	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.29	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**493.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**493.89**	°R
Fully Insulated: TLA = TB	**TLA**	**493.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**494.31**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**494.50**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.29**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.484E-05	
Partially Insulated	Wv	6.492E-05	
Fully Insulated	Wv	6.366E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.17**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**21.70**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0026	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0191**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.41	°R
Average Daily Vapor Pressure Range	ΔPv	0.0006	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0026	psia
Average Daily Liquid Surface Temperature	TLA	493.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.41**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00055**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00293	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00238	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	496.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00049**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00291	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0024131	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	496.44	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**2.031**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0122	86.18	130	0.00051	0.000002	0.003	**0.00077**
benzene	0.0570	78.11	130	0.00239	0.000011	0.003	**0.00398**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.5889	92.14	130	0.02467	0.000092	0.003	**0.03480**
ethylbenzene	0.0673	106.17	130	0.00282	0.000009	0.003	**0.00345**
xylenes	1.2987	106.17	130	0.05440	0.000176	0.003	**0.06661**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0067	128.17	130	2.83E-04	7.58E-07	0.003	**2.87E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9357
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5463
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2700
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1410
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0397
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0343
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0170
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) FEBRUARY

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**23.85**	lb/month
		1.19E-02	ton/month
Time Period		**February**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**50.93**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00283126	
Partially Insulated	P_{VA}	0.0028379	
Fully Insulated	P_{VA}	0.00274842	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.90	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.78**	°R
Fully Insulated: TLA = TB	**TLA**	**494.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.66**	**°R**
Fully Insulated; Tv = TB	**Tv**	**494.90**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.910E-05	
Partially Insulated	Wv	6.922E-05	
Fully Insulated	Wv	6.728E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.51**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.023	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**21.34**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7558	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0229**	**per day**
Average Daily Vapor Temperature Range	ΔTv	13.34	°R
Average Daily Vapor Pressure Range	ΔPv	0.0007	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0028	psia
Average Daily Liquid Surface Temperature	TLA	495.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**13.34**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.05**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00069**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00319	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00251	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	499.05	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.38	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00062**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00316	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0025428	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.77	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**2.036**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0120	86.18	130	0.00050	0.000002	0.003	**0.00076**
benzene	0.0564	78.11	130	0.00237	0.000011	0.003	**0.00394**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.5869	92.14	130	0.02460	0.000098	0.003	**0.03471**
ethylbenzene	0.0677	106.17	130	0.00284	0.000010	0.003	**0.00347**
xylenes	1.3058	106.17	130	0.05475	0.000190	0.003	**0.06704**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0069	128.17	130	2.91E-04	8.34E-07	0.003	**2.95E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.9882
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.5791
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2869
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1505
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0427
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0370
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0184
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) — **MARCH**

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	8		
Total Losses (Eq.1-1: LT = LS+LW)	LT	33.78	lb/month
		1.69E-02	ton/month
Time Period		March	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1175.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	39.00	ft
Diameter	D	60.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	46.00	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	38.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	19.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0036856	
Partially Insulated	P_{VA}	0.00369705	
Fully Insulated	P_{VA}	0.00354332	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	501.10	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	501.98	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	503.10	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	503.19	°R
Fully Insulated: TLA = TB	TLA	502.0	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	504.01	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	504.39	°R
Fully Insulated; Tv = TB	Tv	501.98	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.859E-05	
Partially Insulated	Wv	8.880E-05	
Fully Insulated	Wv	8.551E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	4.14	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.027	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	29.65	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0037	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0266	per day
Average Daily Vapor Temperature Range	ΔTv	15.40	°R
Average Daily Vapor Pressure Range	ΔPv	0.0010	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0037	psia
Average Daily Liquid Surface Temperature	TLA	503.10	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	15.40	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	14.04	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00100	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00422	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00322	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.95	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00091	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00418	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0032649	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	506.69	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	499.68	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	56,902.10	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	20.13	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.63	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	4.12	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Diesel						
Total HAP Emissions =	2.917	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0162	86.18	130	0.00048	0.000003	0.004	0.00072
benzene	0.0770	78.11	130	0.00228	0.000014	0.004	0.00379
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	-
toluene	0.8221	92.14	130	0.02433	0.000127	0.004	0.03433
ethylbenzene	0.0979	106.17	130	0.00290	0.000013	0.004	0.00355
xylenes	1.8931	106.17	130	0.05603	0.000253	0.004	0.06861
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	0.00E+00
naphthalene	0.0109	128.17	130	3.23E-04	1.21E-06	0.004	3.28E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.2212
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7258
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3627
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1938
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0568
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0492
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0250
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0011

Monthly Calculations (continued) — **APRIL**

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	8		
Total Losses (Eq.1-1: LT = LS+LW)	LT	46.92	lb/month
		2.35E-02	ton/month
Time Period		April	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1516.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Distillate Fuel Oil No.2		
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.10	lb/gal
Average Reid Vapor Pressure	RVP	0.02	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.10	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8907.0	°R
Tank design data			
Shell height	Hs	39.00	ft
Diameter	D	60.00	ft
Throughput	Q	3,057,536	gal/month
Turnovers	N	47.53	per year
Roof Type:		Cone	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	38.00	ft
Minimum Filling Height (use 1 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 Hs)	HL	19.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00527152	
Partially Insulated	P_{VA}	0.0052918	
Fully Insulated	P_{VA}	0.00502049	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	510.90	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	512.04	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.48	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.59	°R
Fully Insulated: TLA = TB	TLA	512.0	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.65	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.14	°R
Fully Insulated; Tv = TB	Tv	512.04	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.241E-04	
Partially Insulated	Wv	1.244E-04	
Fully Insulated	Wv	1.188E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	6.46	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	40.46	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	0.99	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0053	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0307	per day
Average Daily Vapor Temperature Range	ΔTv	17.80	°R
Average Daily Vapor Pressure Range	ΔPv	0.0016	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0053	psia
Average Daily Liquid Surface Temperature	TLA	513.48	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	17.80	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	16.34	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00159	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00612	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00453	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	517.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00146	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00607	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0046049	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	517.68	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	509.51	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	56,902.10	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	Hvo	20.13	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	HRO	0.63	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	HRO	4.12	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Diesel						
Total HAP Emissions =	4.105	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0209	86.18	130	0.00045	0.000004	0.005	0.00067
benzene	0.1013	78.11	130	0.00216	0.000019	0.005	0.00359
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	-
toluene	1.1220	92.14	130	0.02391	0.000178	0.005	0.03373
ethylbenzene	0.1394	106.17	130	0.00297	0.000019	0.005	0.00364
xylenes	2.7039	106.17	130	0.05762	0.000372	0.005	0.07056
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.005	0.00E+00
naphthalene	0.0174	128.17	130	3.72E-04	1.99E-06	0.005	3.77E-04

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.6240
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9837
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4974
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2724
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0833
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0724
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0378
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018

Monthly Calculations (continued) MAY

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**65.64**	lb/month
		3.28E-02	ton/month
Time Period		**May**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00725113	
Partially Insulated	P_{VA}	0.00728235	
Fully Insulated	P_{VA}	0.00686583	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	521.42	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**523.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**523.22**	°R
Fully Insulated: TLA = TB	**TLA**	**521.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**524.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**525.03**	**°R**
Fully Insulated; Tv = TB	**Tv**	**521.42**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.675E-04	
Partially Insulated	Wv	1.680E-04	
Fully Insulated	Wv	1.595E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**9.59**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.033	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**56.06**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0073	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0327**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.16	°R
Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0073	psia
Average Daily Liquid Surface Temperature	TLA	523.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.16**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.68**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00227**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00846	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00620	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	527.88	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	518.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00210**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00840	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0062992	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	527.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	518.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Product	Diesel						
Total HAP Emissions =	**5.794**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0274	86.18	130	0.00042	0.000005	0.007	**0.00063**
benzene	0.1347	78.11	130	0.00205	0.000025	0.007	**0.00342**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.007	**-**
toluene	1.5411	92.14	130	0.02348	0.000240	0.007	**0.03312**
ethylbenzene	0.1987	106.17	130	0.00303	0.000027	0.007	**0.00371**
xylenes	3.8646	106.17	130	0.05888	0.000523	0.007	**0.07209**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.007	**0.00E+00**
naphthalene	0.0275	128.17	130	4.19E-04	3.08E-06	0.007	**4.25E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.0893
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.2865
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6575
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3679
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1168
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0544
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) JUNE

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**86.10**	lb/month
		4.30E-02	ton/month
Time Period		**June**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**47.53**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00997505	
Partially Insulated	P_{VA}	0.01001965	
Fully Insulated	P_{VA}	0.00942513	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.27	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.08**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.22**	°R
Fully Insulated: TLA = TB	**TLA**	**531.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**534.55**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**535.16**	**°R**
Fully Insulated; Tv = TB	**Tv**	**531.27**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-04	
Partially Insulated	Wv	2.268E-04	
Fully Insulated	Wv	2.149E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.38**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**73.71**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0324**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.36	°R
Average Daily Vapor Pressure Range	ΔPv	0.0030	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0100	psia
Average Daily Liquid Surface Temperature	TLA	533.08	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.36**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.95**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00303**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01159	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00856	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	537.92	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.24	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00282**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01152	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usi	PVN	0.0086952	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	537.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	528.73	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Product	Diesel						
Total HAP Emissions =	**7.649**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0335	86.18	130	0.00039	0.000006	0.010	**0.00059**
benzene	0.1677	78.11	130	0.00195	0.000032	0.010	**0.00324**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.010	**-**
toluene	1.9802	92.14	130	0.02300	0.000324	0.010	**0.03245**
ethylbenzene	0.2647	106.17	130	0.00307	0.000038	0.010	**0.00376**
xylenes	5.1629	106.17	130	0.05997	0.000732	0.010	**0.07342**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.010	**0.00E+00**
naphthalene	0.0405	128.17	130	4.71E-04	4.76E-06	0.010	**4.77E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.6831
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.6791
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8671
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4958
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1631
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1426
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0779
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) JULY

Tank No.	8						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**14.32**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**103.01**	lb/month	Vapor Space Volume	Vv	56902.1	ft3
		5.15E-02	ton/month	Stock Vapor Density	Wv	0.0003	lb/ft3
Time Period		**July**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**88.69**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Product Type	**Distillate Fuel Oil No.2**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.10**	lb/gal	Stock Vapor Density	Wv	0.0003	lb/ft3
Average Reid Vapor Pressure	RVP	**0.02**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**12.10**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0118	psia
				Vapor Space Outage	Hvo	20.13	ft
Tank design data				**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0310**	**per day**
Shell height	Hs	**39.00**	ft	Average Daily Vapor Temperature Range	ΔTv	18.79	°R
Diameter	D	**60.00**	ft	Average Daily Vapor Pressure Range	ΔPv	0.0034	psi
Throughput	Q	**3,057,536**	gal/month	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Turnovers	N	**46.00**	per year	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0118	psia
Roof Type:		**Cone**		Average Daily Liquid Surface Temperature	TLA	538.52	°R
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Atmospheric Pressure	P_A	14.68	psia
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft				
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft				
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**18.79**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**17.44**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00342**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01363	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.01021	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.22	°R
Not Insulated	P_{VA}	0.0118118		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.83	°R
Partially Insulated	P_{VA}	0.0118627					
Fully Insulated	P_{VA}	0.01118357		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00318**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01355	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0103657	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	543.02	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	534.31	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	536.75	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**56,902.10**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.52**	°R	Tank diameter	D	60.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**538.66**	°R	Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Fully Insulated: TLA = TB	**TLA**	**536.8**					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	39.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.97**	**°R**	Liquid Height	HL	19.50	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.58**	**°R**	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Fully Insulated; Tv = TB	**Tv**	**536.75**	**°R**				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	2.650E-04		Tank shell radius	Rs	30.00	ft
Partially Insulated	Wv	2.658E-04					
Fully Insulated	Wv	2.524E-04		**Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1**	**HRO**	**4.12**	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
				Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**9.175**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0386	86.18	130	0.00037	0.000007	0.012	**0.00057**
benzene	0.1949	78.11	130	0.00189	0.000037	0.012	**0.00315**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.012	**-**
toluene	2.3412	92.14	130	0.02273	0.000379	0.012	**0.03207**
ethylbenzene	0.3189	106.17	130	0.00310	0.000045	0.012	**0.00379**
xylenes	6.2295	106.17	130	0.06047	0.000875	0.012	**0.07405**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.012	**0.00E+00**
naphthalene	0.0514	128.17	130	4.99E-04	5.98E-06	0.012	**5.07E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.0611
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.9319
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0031
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5801
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1945
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1703
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0941
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0054

Monthly Calculations (continued) AUGUST

Tank No.	8						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.80**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**98.61**	lb/month	Vapor Space Volume	Vv	56902.1	ft3
		4.93E-02	ton/month	Stock Vapor Density	Wv	0.0003	lb/ft3
Time Period		**August**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	0.99	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**85.81**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Product Type	**Distillate Fuel Oil No.2**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.10**	lb/gal	Stock Vapor Density	Wv	0.0003	lb/ft3
Average Reid Vapor Pressure	RVP	**0.02**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**12.10**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
				Vapor Space Outage	Hvo	20.13	ft
Tank design data				**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0286**	**per day**
Shell height	Hs	**39.00**	ft	Average Daily Vapor Temperature Range	ΔTv	17.48	°R
Diameter	D	**60.00**	ft	Average Daily Vapor Pressure Range	ΔPv	0.0031	psi
Throughput	Q	**3,057,536**	gal/month	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Turnovers	N	**46.00**	per year	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0114	psia
Roof Type:		**Cone**		Average Daily Liquid Surface Temperature	TLA	537.37	°R
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Atmospheric Pressure	P_A	14.68	psia
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft				
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft				
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**17.48**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**16.17**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00308**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01303	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00995	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.74	°R
Not Insulated	P_{VA}	0.01140096		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.00	°R
Partially Insulated	P_{VA}	0.01144484					
Fully Insulated	P_{VA}	0.01085779		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00286**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01295	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0100946	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	541.54	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	533.46	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.80	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**56,902.10**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**537.37**	°R	Tank diameter	D	60.00	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.50**	°R	Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Fully Insulated: TLA = TB	**TLA**	**535.8**					
				Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Average Vapor Temperature (Tv)				Tank shell height	Hs	39.00	ft
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.66**	**°R**	Liquid Height	HL	19.50	ft
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.20**	**°R**	Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Fully Insulated; Tv = TB	**Tv**	**535.80**	**°R**				
				Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)				Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Not Insulated	Wv	2.564E-04		Tank shell radius	Rs	30.00	ft
Partially Insulated	Wv	2.571E-04					
Fully Insulated	Wv	2.455E-04		**Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.1**	**HRO**	**4.12**	ft
				Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
				Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**8.779**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0372	86.18	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.1877	78.11	130	0.00190	0.000036	0.011	**0.00317**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	2.2469	92.14	130	0.02279	0.000367	0.011	**0.03215**
ethylbenzene	0.3049	106.17	130	0.00309	0.000043	0.011	**0.00379**
xylenes	5.9532	106.17	130	0.06037	0.000843	0.011	**0.07392**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.011	**0.00E+00**
naphthalene	0.0486	128.17	130	4.93E-04	5.70E-06	0.011	**5.00E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.9779
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8760
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9730
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5614
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1875
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1641
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0904
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**77.04**	lb/month
		3.85E-02	ton/month
Time Period		**September**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**47.53**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00911275	
Partially Insulated	P_{VA}	0.00914155	
Fully Insulated	P_{VA}	0.00875484	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	528.95	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**530.21**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**530.31**	°R
Fully Insulated: TLA = TB	**TLA**	**528.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**531.24**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**531.67**	**°R**
Fully Insulated; Tv = TB	**Tv**	**528.95**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.078E-04	
Partially Insulated	Wv	2.083E-04	
Fully Insulated	Wv	2.005E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**9.28**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**67.76**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0091	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0264**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.09	°R
Average Daily Vapor Pressure Range	ΔPv	0.0023	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0091	psia
Average Daily Liquid Surface Temperature	TLA	530.21	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.09**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.74**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00233**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.01034	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00801	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.23	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.19	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00214**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.01026	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0081279	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	533.99	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.62	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**6.834**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} **(lb/month)**	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0306	86.18	130	0.00040	0.000005	0.009	**0.00060**
benzene	0.1523	78.11	130	0.00198	0.000030	0.009	**0.00329**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.009	**-**
toluene	1.7827	92.14	130	0.02314	0.000298	0.009	**0.03265**
ethylbenzene	0.2359	106.17	130	0.00306	0.000034	0.009	**0.00375**
xylenes	4.5973	106.17	130	0.05967	0.000666	0.009	**0.07307**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.009	**0.00E+00**
naphthalene	0.0351	128.17	130	4.56E-04	4.21E-06	0.009	**4.62E-04**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.4999
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.5573
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.8018
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4557
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1484
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1297
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0704
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0038

Monthly Calculations (continued) **OCTOBER**

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**54.43**	lb/month
		2.72E-02	ton/month
Time Period		**October**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.00619435	
Partially Insulated	P_{VA}	0.00620929	
Fully Insulated	P_{VA}	0.00600781	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.38	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.30**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**518.37**	°R
Fully Insulated: TLA = TB	**TLA**	**517.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**519.36**	**°R**
Fully Insulated; Tv = TB	**Tv**	**517.38**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.446E-04	
Partially Insulated	Wv	1.448E-04	
Fully Insulated	Wv	1.407E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**6.05**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.024	per day
Vented Vapor Saturation Factor	Ks	0.99	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**48.38**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**0.99**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0062	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0239**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.44	°R
Average Daily Vapor Pressure Range	ΔPv	0.0015	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0062	psia
Average Daily Liquid Surface Temperature	TLA	518.30	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**14.44**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.07**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00148**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00698	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00549	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.91	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	514.69	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00135**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00691	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0055683	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	521.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	515.10	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**4.785**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} **(lb/month)**	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0234	86.18	130	0.00043	0.000004	0.006	**0.00065**
benzene	0.1146	78.11	130	0.00211	0.000022	0.006	**0.00350**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.006	**-**
toluene	1.2898	92.14	130	0.02370	0.000207	0.006	**0.03343**
ethylbenzene	0.1633	106.17	130	0.00300	0.000023	0.006	**0.00367**
xylenes	3.1720	106.17	130	0.05828	0.000442	0.006	**0.07136**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.006	**0.00E+00**
naphthalene	0.0215	128.17	130	3.95E-04	2.48E-06	0.006	**4.01E-04**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.8452
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.1271
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.5730
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3172
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0989
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0861
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0454
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0022

Monthly Calculations (continued) NOVEMBER

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**37.50**	lb/month
		1.87E-02	ton/month
Time Period		**November**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**47.53**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.0043906	
Partially Insulated	P_{VA}	0.00439776	
Fully Insulated	P_{VA}	0.00430077	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	507.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**508.17**	°R
Fully Insulated: TLA = TB	**TLA**	**507.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**508.61**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**508.81**	**°R**
Fully Insulated; Tv = TB	**Tv**	**507.52**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.046E-04	
Partially Insulated	Wv	1.047E-04	
Fully Insulated	Wv	1.027E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.40**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**34.10**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.7978	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0044	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0191**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.76	°R
Average Daily Vapor Pressure Range	ΔPv	0.0009	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0044	psia
Average Daily Liquid Surface Temperature	TLA	508.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.76**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.53**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00089**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00486	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00396	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.06	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.18	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00080**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00481	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0040141	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	510.80	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	505.54	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**3.260**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0173	86.18	130	0.00046	0.000003	0.004	**0.00070**
benzene	0.0832	78.11	130	0.00222	0.000016	0.004	**0.00369**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.004	**-**
toluene	0.9050	92.14	130	0.02414	0.000150	0.004	**0.03405**
ethylbenzene	0.1100	106.17	130	0.00293	0.000016	0.004	**0.00359**
xylenes	2.1311	106.17	130	0.05683	0.000306	0.004	**0.06959**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.004	**0.00E+00**
naphthalene	0.0130	128.17	130	3.46E-04	1.54E-06	0.004	**3.51E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.4043
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.8425
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4235
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2290
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0685
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0595
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0306
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) DECEMBER

Tank No.	8		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**27.64**	lb/month
		1.38E-02	ton/month
Time Period		**December**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Distillate Fuel Oil No.2**		
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.10**	lb/gal
Average Reid Vapor Pressure	RVP	**0.02**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.10**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R
Tank design data			
Shell height	Hs	**39.00**	ft
Diameter	D	**60.00**	ft
Throughput	Q	**3,057,536**	gal/month
Turnovers	N	**46.00**	per year
Roof Type:		**Cone**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height (use Hs-1 if unknown)	HLX	**38.00**	ft
Minimum Filling Height (use 1 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 Hs)	HL	**19.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.003116053	
Partially Insulated	P_{VA}	0.003120355	
Fully Insulated	P_{VA}	0.003062014	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	497.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**498.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**498.41**	°R
Fully Insulated: TLA = TB	**TLA**	**497.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**498.77**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**498.94**	**°R**
Fully Insulated; Tv = TB	**Tv**	**497.88**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.568E-05	
Partially Insulated	Wv	7.576E-05	
Fully Insulated	Wv	7.450E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.31**	lb/month
Vapor Space Volume	Vv	56902.1	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.017	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**25.33**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	408,691	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=	KN	0.8189	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0001	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0031	psia
Vapor Space Outage	Hvo	20.13	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0174**	**per day**
Average Daily Vapor Temperature Range	ΔTv	10.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0006	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0031	psia
Average Daily Liquid Surface Temperature	TLA	498.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**10.69**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**9.53**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00060**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp	PVX	0.00343	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	0.00283	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	495.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00053**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usi	PVX	0.00340	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usir	PVN	0.0028638	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.	TLX	500.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.03	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56,902.10**	ft3
Tank diameter	D	60.00	ft
Vapor Space Outage; see Equation 1-16	Hvo	20.13	ft
Vapor Space Outage (Eq. 1-16: Hvo=Hs-HL+HRO)	**Hvo**	**20.13**	ft
Tank shell height	Hs	39.00	ft
Liquid Height	HL	19.50	ft
Roof Outage (for a Cone Roof vs Dome Roof)	HRO	0.63	ft
Roof Outage - Cone Roof (Eq. 1-17 & 1-18: HRO=(1/3)SR*Rs)	**HRO**	**0.63**	ft
Tank cone roof slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Tank shell radius	Rs	30.00	ft
Roof Outage - Dome Roof (Eq. 1-19 & 1-20: HRO=(RR-(RR^2-Rs^2)^0.5)*(0.5+0.16	**HRO**	**4.12**	ft
Tank dome roof radius (If unknown, use tank diameter (D) or (2Rs))	RR	60.00	ft
Tank shell radius	Rs	30.00	ft

HAPS Speciation	**lb/month**						
Product	Diesel						
Total HAP Emissions =	**2.370**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0137	86.18	130	0.00050	0.000002	0.003	**0.00075**
benzene	0.0645	78.11	130	0.00233	0.000012	0.003	**0.00389**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.6776	92.14	130	0.02451	0.000108	0.003	**0.03458**
ethylbenzene	0.0790	106.17	130	0.00286	0.000011	0.003	**0.00350**
xylenes	1.5266	106.17	130	0.05523	0.000211	0.003	**0.06762**
cumene	0.0000	120.19	130	0.00000	0.00E+00	0.003	**0.00E+00**
naphthalene	0.0084	128.17	130	3.02E-04	9.55E-07	0.003	**3.06E-04**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.0674
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6288
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3125
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1650
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0474
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0410
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0206
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009

HT TANK EMISSION CALCULATION

Tank No.	11		Tank type	Horizontal Fixed Roof Tank		Date	11/15/21

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	2.87	lb/year
		0.00	ton/year
Time Period		Annual	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1231.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B	B	0.0	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	4.71	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	5.53	ft
Throughput	Q	9,600	gal/yr
Turnovers	N	11.35	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	4.71	ft
Minimum Filling Height (use 0 if unknown)	HLN	0.00	ft
Liquid height (assume 1/2 H_E)	HL	2.36	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.08231444	
Partially Insulated	P_{VA}	0.08258613	
Fully Insulated	P_{VA}	0.07893925	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	514.00	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	514.92	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	516.09	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	516.19	°R
Fully Insulated: TLA = TB	TLA	514.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	517.05	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	517.45	°R
Fully Insulated; Tv = TB	Tv	514.92	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.575E-03	
Partially Insulated	Wv	1.579E-03	
Fully Insulated	Wv	1.517E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.84	lb/yr
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0016	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	2.02	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,283	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0016	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0823	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0260	per day
Average Daily Vapor Temperature Range	ΔTv	15.54	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0823	psia
Average Daily Liquid Surface Temperature	TLA	516.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	15.54	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	14.20	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.21	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	512.64	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	56.55	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Product	Additive						
Total HAP Emissions =	2.866						
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/yr)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.082	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.082	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.082	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.082	-
ethylbenzene	0.7325	106.17	106	0.25556	0.021037	0.082	0.25556
xylenes	2.1337	106.17	106	0.74444	0.061278	0.082	0.74444
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.082	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.082	0.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.7412
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.0595
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.5373
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2960
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0915
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0796
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0418
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0020

Monthly Calculations - JANUARY

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.10	lb/month
		4.99E-05	ton/month
	Time Period	January	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	588.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	4.71	ft
Diameter	D	5.53	ft
Throughput	Q	800	gal/month
Turnovers	N	11.13	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	3.71	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	2.36	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03555179	
Partially Insulated	P_{VA}	0.0356144	
Fully Insulated	P_{VA}	0.03476692	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	492.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.29	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	493.85	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	493.89	°R
Fully Insulated: TLA = TB	TLA	493.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	494.31	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	494.50	°R
Fully Insulated; Tv = TB	Tv	493.29	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.116E-04	
Partially Insulated	Wv	7.126E-04	
Fully Insulated	Wv	6.973E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.02	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0007	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.08	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0007	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0356	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0190	per day
Average Daily Vapor Temperature Range	ΔTv	11.41	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0356	psia
Average Daily Liquid Surface Temperature	TLA	493.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	11.41	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	10.20	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	496.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	496.44	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	491.34	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	56.55	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	0.100

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.036	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.036	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.036	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.036	-
ethylbenzene	0.0256	106.17	106	0.25672	0.009127	0.036	0.25672
xylenes	0.0742	106.17	106	0.74328	0.026425	0.036	0.74328
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.036	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.036	0.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.9357
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5463
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2700
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1410
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0397
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0343
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0170
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) **FEBRUARY**

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.11	lb/month
		5.46E-05	ton/month
	Time Period	February	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	861.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	4.71	ft
Diameter	D	5.53	ft
Throughput	Q	800	gal/month
Turnovers	N	12.33	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	3.71	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	2.36	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03828375	
Partially Insulated	P_{VA}	0.03838158	
Fully Insulated	P_{VA}	0.03706329	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	494.25	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.90	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	495.71	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	495.78	°R
Fully Insulated: TLA = TB	TLA	494.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	496.38	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	496.66	°R
Fully Insulated; Tv = TB	Tv	494.90	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.631E-04	
Partially Insulated	Wv	7.646E-04	
Fully Insulated	Wv	7.410E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.03	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.023	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.08	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0383	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0228	per day
Average Daily Vapor Temperature Range	ΔTv	13.34	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0383	psia
Average Daily Liquid Surface Temperature	TLA	495.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	13.34	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	12.05	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	499.05	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.38	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	492.77	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	56.55	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	0.109

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.038	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.038	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.038	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.038	-
ethylbenzene	0.0280	106.17	106	0.25662	0.009825	0.038	0.25662
xylenes	0.0811	106.17	106	0.74338	0.028459	0.038	0.74338
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.038	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.038	0.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.9882
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5791
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2869
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1505
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0427
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0370
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0184
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) — MARCH

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.15**	lb/month
		7.68E-05	ton/month
Time Period		**March**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.13**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.05098135	
Partially Insulated	P_{VA}	0.05115265	
Fully Insulated	P_{VA}	0.04885432	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	501.98	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**503.10**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**503.19**	°R
Fully Insulated: TLA = TB	**TLA**	**502.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**504.01**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**504.39**	**°R**
Fully Insulated; Tv = TB	**Tv**	**501.98**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.001E-03	
Partially Insulated	Wv	1.003E-03	
Fully Insulated	Wv	9.629E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.05**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.11**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0010	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0510	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0265**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.40	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0510	psia
Average Daily Liquid Surface Temperature	TLA	503.10	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.40**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.04**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.95	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	506.69	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	499.68	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**0.154**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.051	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.051	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.051	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.051	-
ethylbenzene	0.0393	106.17	106	0.25625	0.013064	0.051	**0.25625**
xylenes	0.1142	106.17	106	0.74375	0.037918	0.051	**0.74375**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.051	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.051	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.2212
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7258
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3627
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1938
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0568
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0492
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0250
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0011

Monthly Calculations (continued) — APRIL

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.23**	lb/month
		1.14E-04	ton/month
Time Period		**April**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.50**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.07493163	
Partially Insulated	P_{VA}	0.07524024	
Fully Insulated	P_{VA}	0.07111625	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	512.04	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.48**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.59**	°R
Fully Insulated: TLA = TB	**TLA**	**512.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.65**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.14**	**°R**
Fully Insulated; Tv = TB	**Tv**	**512.04**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.440E-03	
Partially Insulated	Wv	1.445E-03	
Fully Insulated	Wv	1.374E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.07**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.15**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0014	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0749	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0306**	**per day**
Average Daily Vapor Temperature Range	ΔTv	17.80	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0749	psia
Average Daily Liquid Surface Temperature	TLA	513.48	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**17.80**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.34**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	517.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	517.68	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	509.51	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**0.229**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.075	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.0585	106.17	106	0.25570	0.019160	0.075	**0.25570**
xylenes	0.1702	106.17	106	0.74430	0.055771	0.075	**0.74430**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.075	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.6240
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9837
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4974
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2724
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0833
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0724
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0378
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018

Monthly Calculations (continued) — MAY

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.33**	lb/month
		1.63E-04	ton/month
Time Period		**May**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.13**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10523837	
Partially Insulated	P_{VA}	0.10571874	
Fully Insulated	P_{VA}	0.09931446	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	521.42	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**523.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**523.22**	°R
Fully Insulated: TLA = TB	**TLA**	**521.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**524.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**525.03**	**°R**
Fully Insulated; Tv = TB	**Tv**	**521.42**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.985E-03	
Partially Insulated	Wv	1.992E-03	
Fully Insulated	Wv	1.884E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.11**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0020	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.033	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.21**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0020	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0325**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.16	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1052	psia
Average Daily Liquid Surface Temperature	TLA	523.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.16**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.68**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	527.88	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	518.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	527.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	518.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	0.325
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.105	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.105	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.105	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.105	-
ethylbenzene	0.0830	106.17	106	0.25519	0.026856	0.105	**0.25519**
xylenes	0.2424	106.17	106	0.74481	0.078383	0.105	**0.74481**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.105	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.105	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0893
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2865
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6575
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3679
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1168
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0544
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) — JUNE

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.44**	lb/month
		2.20E-04	ton/month
Time Period		**June**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.50**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.14734433	
Partially Insulated	P_{VA}	0.14803618	
Fully Insulated	P_{VA}	0.13881809	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.27	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.08**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.22**	°R
Fully Insulated: TLA = TB	**TLA**	**531.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**534.55**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**535.16**	**°R**
Fully Insulated; Tv = TB	**Tv**	**531.27**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.727E-03	
Partially Insulated	Wv	2.737E-03	
Fully Insulated	Wv	2.585E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.15**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0027	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.29**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0027	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1473	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0322**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.36	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1473	psia
Average Daily Liquid Surface Temperature	TLA	533.08	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.36**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.95**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	537.92	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.24	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	537.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	528.73	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	0.441
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.147	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.147	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.147	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.147	-
ethylbenzene	0.1122	106.17	106	0.25465	0.037521	0.147	**0.25465**
xylenes	0.3284	106.17	106	0.74535	0.109823	0.147	**0.74535**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.147	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.147	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.6831
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.6791
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8671
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4958
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1631
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1426
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0779
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) JULY

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.52**	lb/month
		2.59E-04	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	^oR
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.13**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.17588603	
Partially Insulated	P_{VA}	0.17667803	
Fully Insulated	P_{VA}	0.16611413	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	^oR
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	^oR
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	^oR
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	536.75	^oR
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.52**	^oR
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**538.66**	^oR
Fully Insulated: TLA = TB	**TLA**	**536.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.97**	**^oR**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.58**	**^oR**
Fully Insulated; Tv = TB	**Tv**	**536.75**	**^oR**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.223E-03	
Partially Insulated	Wv	3.234E-03	
Fully Insulated	Wv	3.062E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.17**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0032	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.34**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0032	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1759	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0307**	**per day**
Average Daily Vapor Temperature Range	ΔTv	18.79	^oR
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1759	psia
Average Daily Liquid Surface Temperature	TLA	538.52	^oR
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	^oR
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.79**	**^oR**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.44**	^oR
Fully Insulated, constant temperature	**ΔTv**	**0.00**	^oR
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.22	^oR
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.83	^oR
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.02	^oR
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	534.31	^oR
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.518**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.176	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.176	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.176	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.176	-
ethylbenzene	0.1318	106.17	106	0.25435	0.044737	0.176	**0.25435**
xylenes	0.3865	106.17	106	0.74565	0.131149	0.176	**0.74565**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.176	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.176	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.0611
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9319
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0031
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5801
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1945
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1703
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0941
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054

Monthly Calculations (continued) AUGUST

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.49**	lb/month
		2.44E-04	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	^oR
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.13**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.16949461	
Partially Insulated	P_{VA}	0.1701771	
Fully Insulated	P_{VA}	0.16105057	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	^oR
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	^oR
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	^oR
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.80	^oR
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**537.37**	^oR
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.50**	^oR
Fully Insulated: TLA = TB	**TLA**	**535.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.66**	**^oR**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.20**	**^oR**
Fully Insulated; Tv = TB	**Tv**	**535.80**	**^oR**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.113E-03	
Partially Insulated	Wv	3.123E-03	
Fully Insulated	Wv	2.974E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.15**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0031	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.028	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.33**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0031	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1695	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0284**	**per day**
Average Daily Vapor Temperature Range	ΔTv	17.48	^oR
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1695	psia
Average Daily Liquid Surface Temperature	TLA	537.37	^oR
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	^oR
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**17.48**	**^oR**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.17**	^oR
Fully Insulated, constant temperature	**ΔTv**	**0.00**	^oR
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.74	^oR
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.00	^oR
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	541.54	^oR
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	533.46	^oR
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.488**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.169	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.169	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.169	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.169	-
ethylbenzene	0.1241	106.17	106	0.25441	0.043122	0.169	**0.25441**
xylenes	0.3637	106.17	106	0.74559	0.126373	0.169	**0.74559**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.169	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.169	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9779
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8760
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9730
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5614
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1875
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1641
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0904
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	11						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.11**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.38**	lb/month	Vapor Space Volume	Vv	56.5	ft3
		1.89E-04	ton/month	Stock Vapor Density	Wv	0.0025	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day	Constant: Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.27**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Product Type		**Gasoline Additive**		Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0025	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1340	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**4.71**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0262**	**per day**
Diameter	D	**5.53**	ft	Average Daily Vapor Temperature Range	ΔTv	16.09	°R
Throughput	Q	**800**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**11.50**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1340	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	530.21	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**2.36**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.09**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**14.74**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.23	°R
Not Insulated	P_{VA}	0.13397983		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.19	°R
Partially Insulated	P_{VA}	0.1344257					
Fully Insulated	P_{VA}	0.12844104		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R	Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.99	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	526.62	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	528.95	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**56.55**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**530.21**	°R	Effective Tank diameter	D_E	5.53	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**530.31**	°R	Effective Tank Height	H_E	4.71	ft
Fully Insulated: TLA = TB	**TLA**	**528.9**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**531.24**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**531.67**	**°R**				
Fully Insulated: Tv = TB	**Tv**	**528.95**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.495E-03					
Partially Insulated	Wv	2.502E-03					
Fully Insulated	Wv	2.402E-03					

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**0.378**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

		Vapor Weight Concentrations			Vapor Mole Fraction		
		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.134	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.134	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.134	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.134	-
ethylbenzene	0.0963	106.17	106	0.25480	0.034139	0.134	**0.25480**
xylenes	0.2816	106.17	106	0.74520	0.099841	0.134	**0.74520**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.134	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.134	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.4999
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.5573
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8018
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4557
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1484
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1297
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0704
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0038

Monthly Calculations (continued) **OCTOBER**

Tank No.	11						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.07**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.25**	lb/month	Vapor Space Volume	Vv	56.5	ft3
		1.26E-04	ton/month	Stock Vapor Density	Wv	0.0017	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.024	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day	Constant: Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.18**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Product Type		**Gasoline Additive**		Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0017	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0890	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**4.71**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0237**	**per day**
Diameter	D	**5.53**	ft	Average Daily Vapor Temperature Range	ΔTv	14.44	°R
Throughput	Q	**800**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**11.13**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0890	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	518.30	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**2.36**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**14.44**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**13.07**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.91	°R
Not Insulated	P_{VA}	0.08901713		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	514.69	°R
Partially Insulated	P_{VA}	0.08924588					
Fully Insulated	P_{VA}	0.08616321		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R	Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	521.64	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	515.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.38	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**56.55**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.30**	°R	Effective Tank diameter	D_E	5.53	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**518.37**	°R	Effective Tank Height	H_E	4.71	ft
Fully Insulated: TLA = TB	**TLA**	**517.4**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.05**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**519.36**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**517.38**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.697E-03					
Partially Insulated	Wv	1.700E-03					
Fully Insulated	Wv	1.648E-03					

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**0.252**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

		Vapor Weight Concentrations			Vapor Mole Fraction		
		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.089	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.089	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.089	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.089	-
ethylbenzene	0.0644	106.17	106	0.25545	0.022739	0.089	**0.25545**
xylenes	0.1877	106.17	106	0.74455	0.066278	0.089	**0.74455**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.089	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.089	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.8452
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.1271
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.5730
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3172
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0989
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0861
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0454
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0022

Monthly Calculations (continued) **NOVEMBER**

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.17**	lb/month
		8.34E-05	ton/month
Time Period		**November**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.50**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06157932	
Partially Insulated	P_{VA}	0.06168743	
Fully Insulated	P_{VA}	0.06022408	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	507.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**508.17**	°R
Fully Insulated: TLA = TB	**TLA**	**507.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**508.61**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**508.81**	**°R**
Fully Insulated; Tv = TB	**Tv**	**507.52**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.198E-03	
Partially Insulated	Wv	1.199E-03	
Fully Insulated	Wv	1.174E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.04**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.13**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0616	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0190**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.76	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0616	psia
Average Daily Liquid Surface Temperature	TLA	508.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.76**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.53**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.06	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.18	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	510.80	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	505.54	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.167**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.062	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.062	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.062	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.062	**-**
ethylbenzene	0.0427	106.17	106	0.25599	0.015763	0.062	**0.25599**
xylenes	0.1241	106.17	106	0.74401	0.045816	0.062	**0.74401**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.062	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.062	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4043
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8425
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4235
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2290
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0685
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0595
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0306
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) **DECEMBER**

Tank No.	11		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.12**	lb/month
		5.79E-05	ton/month
Time Period		**December**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**4.71**	ft
Diameter	D	**5.53**	ft
Throughput	Q	**800**	gal/month
Turnovers	N	**11.13**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.71**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**2.36**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04249522	
Partially Insulated	P_{VA}	0.04255902	
Fully Insulated	P_{VA}	0.04169431	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	497.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**498.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**498.41**	°R
Fully Insulated: TLA = TB	**TLA**	**497.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**498.77**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**498.94**	**°R**
Fully Insulated; Tv = TB	**Tv**	**497.88**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.429E-04	
Partially Insulated	Wv	8.439E-04	
Fully Insulated	Wv	8.285E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Vapor Space Volume	Vv	56.5	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.017	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.09**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	107	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0425	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0173**	**per day**
Average Daily Vapor Temperature Range	ΔTv	10.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0425	psia
Average Daily Liquid Surface Temperature	TLA	498.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**10.69**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**9.53**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	495.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	500.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	496.03	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**56.55**	ft3
Effective Tank diameter	D_E	5.53	ft
Effective Tank Height	H_E	4.71	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	2.36	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.116**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.042	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.042	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.042	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.042	**-**
ethylbenzene	0.0297	106.17	106	0.25649	0.010900	0.042	**0.25649**
xylenes	0.0861	106.17	106	0.74351	0.031596	0.042	**0.74351**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.042	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.042	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0674
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6288
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3125
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1650
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0474
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0410
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0206
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

HT TANK EMISSION CALCULATION

Tank No.	12		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**36.77**	lb/year
		0.02	ton/year
Time Period		**Annual**	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B	B	**0.0**	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	**11.00**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**13.35**	ft
Throughput	Q	**120,000**	gal/yr
Turnovers	N	**10.42**	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**11.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.08231444	
Partially Insulated	P_{VA}	0.08258613	
Fully Insulated	P_{VA}	0.07893925	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	514.92	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**516.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**516.19**	°R
Fully Insulated: TLA = TB	**TLA**	**514.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**517.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.45**	**°R**
Fully Insulated; Tv = TB	**Tv**	**514.92**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.575E-03	
Partially Insulated	Wv	1.579E-03	
Fully Insulated	Wv	1.517E-03	

Horizontal Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**11.50**	lb/yr
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0016	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**25.26**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	16,040	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0016	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0823	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0260**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.54	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0823	psia
Average Daily Liquid Surface Temperature	TLA	516.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.54**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.21	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	512.64	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	36.766						
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.082	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.082	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.082	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.082	-
ethylbenzene	9.3960	106.17	106	0.25556	0.021037	0.082	**0.25556**
xylenes	27.3697	106.17	106	0.74444	0.061278	0.082	**0.74444**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.082	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.082	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.7412
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.0595
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.5373
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2960
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0915
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0796
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0418
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0020

Monthly Calculations - JANUARY

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.27**	lb/month
		6.37E-04	ton/month
Time Period		**January**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**10,000**	gal/month
Turnovers	N	**10.22**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03555179	
Partially Insulated	P_{VA}	0.0356144	
Fully Insulated	P_{VA}	0.03476692	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.29	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**493.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**493.89**	°R
Fully Insulated: TLA = TB	**TLA**	**493.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**494.31**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**494.50**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.29**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.116E-04	
Partially Insulated	Wv	7.126E-04	
Fully Insulated	Wv	6.973E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.32**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0007	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.95**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0007	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0356	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0190**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.41	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0356	psia
Average Daily Liquid Surface Temperature	TLA	493.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.41**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	496.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	496.44	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**1.274**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.036	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.036	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.036	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.036	-
ethylbenzene	0.3270	106.17	106	0.25672	0.009127	0.036	**0.25672**
xylenes	0.9468	106.17	106	0.74328	0.026425	0.036	**0.74328**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.036	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.036	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.9357
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5463
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2700
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1410
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0397
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0343
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0170
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) **FEBRUARY**

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.39**	lb/month
		6.97E-04	ton/month
Time Period		**February**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**10,000**	gal/month
Turnovers	N	**11.32**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03828375	
Partially Insulated	P_{VA}	0.03838158	
Fully Insulated	P_{VA}	0.03706329	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.90	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.78**	°R
Fully Insulated: TLA = TB	**TLA**	**494.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.66**	**°R**
Fully Insulated; Tv = TB	**Tv**	**494.90**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.631E-04	
Partially Insulated	Wv	7.646E-04	
Fully Insulated	Wv	7.410E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.37**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.023	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.02**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0383	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0228**	**per day**
Average Daily Vapor Temperature Range	ΔTv	13.34	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0383	psia
Average Daily Liquid Surface Temperature	TLA	495.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**13.34**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.05**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	499.05	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.38	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.77	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**1.395**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.038	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.038	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.038	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.038	-
ethylbenzene	0.3580	106.17	106	0.25662	0.009825	0.038	**0.25662**
xylenes	1.0370	106.17	106	0.74338	0.028459	0.038	**0.74338**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.038	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.038	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.9882
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5791
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2869
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1505
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0427
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0370
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0184
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) — MARCH

Tank No.	12						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.63**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.97**	lb/month	Vapor Space Volume	Vv	769.7	ft3
		9.85E-04	ton/month	Stock Vapor Density	Wv	0.0010	lb/ft3
Time Period		**March**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day	Constant: Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.34**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Product Type		**Gasoline Additive**		Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0010	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0510	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**11.00**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0265**	**per day**
Diameter	D	**13.35**	ft	Average Daily Vapor Temperature Range	ΔTv	15.40	°R
Throughput	Q	**10,000**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.22**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0510	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	503.10	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**15.40**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**14.04**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.95	°R
Not Insulated	P_{VA}	0.05098135		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.25	°R
Partially Insulated	P_{VA}	0.05115265					
Fully Insulated	P_{VA}	0.04885432		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	506.69	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	499.68	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	501.98	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**769.69**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**503.10**	°R	Effective Tank diameter	D_E	13.35	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**503.19**	°R	Effective Tank Height	H_E	11.00	ft
Fully Insulated: TLA = TB	**TLA**	**502.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**504.01**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**504.39**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**501.98**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.001E-03					
Partially Insulated	Wv	1.003E-03					
Fully Insulated	Wv	9.629E-04					

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**1.970**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.051	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.051	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.051	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.051	-
ethylbenzene	0.5049	106.17	106	0.25625	0.013064	0.051	**0.25625**
xylenes	1.4655	106.17	106	0.74375	0.037918	0.051	**0.74375**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.051	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.051	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.2212
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7258
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3627
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1938
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0568
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0492
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0250
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0011

Monthly Calculations (continued) — APRIL

Tank No.	12						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.02**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.94**	lb/month	Vapor Space Volume	Vv	769.7	ft3
		1.47E-03	ton/month	Stock Vapor Density	Wv	0.0014	lb/ft3
Time Period		**April**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day	Constant: Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.93**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Product Type		**Gasoline Additive**		Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0014	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0749	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**11.00**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0306**	**per day**
Diameter	D	**13.35**	ft	Average Daily Vapor Temperature Range	ΔTv	17.80	°R
Throughput	Q	**10,000**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.56**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0749	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.48	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**17.80**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**16.34**	°R
Tank Shell Color (pick from drop down list)		**White**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	517.93	°R
Not Insulated	P_{VA}	0.07493163		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.03	°R
Partially Insulated	P_{VA}	0.07524024					
Fully Insulated	P_{VA}	0.07111625		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	517.68	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	509.51	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	512.04	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**769.69**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.48**	°R	Effective Tank diameter	D_E	13.35	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.59**	°R	Effective Tank Height	H_E	11.00	ft
Fully Insulated: TLA = TB	**TLA**	**512.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.65**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.14**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**512.04**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.440E-03					
Partially Insulated	Wv	1.445E-03					
Fully Insulated	Wv	1.374E-03					

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**2.942**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.075	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.7522	106.17	106	0.25570	0.019160	0.075	**0.25570**
xylenes	2.1896	106.17	106	0.74430	0.055771	0.075	**0.74430**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.075	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.6240
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9837
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4974
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2724
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0833
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0724
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0378
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018

Monthly Calculations (continued) MAY

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.19**	lb/month
		2.10E-03	ton/month
Time Period		**May**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**10,000**	gal/month
Turnovers	N	**10.22**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10523837	
Partially Insulated	P_{VA}	0.10571874	
Fully Insulated	P_{VA}	0.09931446	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	521.42	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**523.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**523.22**	°R
Fully Insulated: TLA = TB	**TLA**	**521.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**524.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**525.03**	**°R**
Fully Insulated: Tv = TB	**Tv**	**521.42**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.985E-03	
Partially Insulated	Wv	1.992E-03	
Fully Insulated	Wv	1.884E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.54**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0020	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.033	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.65**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0020	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0325**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.16	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1052	psia
Average Daily Liquid Surface Temperature	TLA	523.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.16**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.68**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	527.88	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	518.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	527.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	518.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**4.194**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.105	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.105	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.105	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.105	**-**
ethylbenzene	1.0702	106.17	106	0.25519	0.026856	0.105	**0.25519**
xylenes	3.1236	106.17	106	0.74481	0.078383	0.105	**0.74481**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.105	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.105	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0893
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2865
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6575
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3679
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1168
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0544
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) JUNE

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.67**	lb/month
		2.84E-03	ton/month
Time Period		**June**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**10,000**	gal/month
Turnovers	N	**10.56**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.14734433	
Partially Insulated	P_{VA}	0.14803618	
Fully Insulated	P_{VA}	0.13881809	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.27	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.08**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.22**	°R
Fully Insulated: TLA = TB	**TLA**	**531.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**534.55**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**535.16**	**°R**
Fully Insulated; Tv = TB	**Tv**	**531.27**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.727E-03	
Partially Insulated	Wv	2.737E-03	
Fully Insulated	Wv	2.585E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.03**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0027	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.65**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0027	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1473	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0322**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.36	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1473	psia
Average Daily Liquid Surface Temperature	TLA	533.08	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.36**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.95**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	537.92	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.24	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	537.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	528.73	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**5.672**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.147	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.147	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.147	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.147	**-**
ethylbenzene	1.4444	106.17	106	0.25465	0.037521	0.147	**0.25465**
xylenes	4.2278	106.17	106	0.74535	0.109823	0.147	**0.74535**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.147	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.147	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.6831
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.6791
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8671
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4958
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1631
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1426
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0779
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) **JULY**

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**6.67**	lb/month
		3.34E-03	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**10,000**	gal/month
Turnovers	N	**10.22**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.17588603	
Partially Insulated	P_{VA}	0.17667803	
Fully Insulated	P_{VA}	0.16611413	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	536.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.52**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**538.66**	°R
Fully Insulated: TLA = TB	**TLA**	**536.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.97**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.58**	**°R**
Fully Insulated; Tv = TB	**Tv**	**536.75**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.223E-03	
Partially Insulated	Wv	3.234E-03	
Fully Insulated	Wv	3.062E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.36**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0032	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**4.31**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0032	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1759	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0307**	**per day**
Average Daily Vapor Temperature Range	ΔTv	18.79	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1759	psia
Average Daily Liquid Surface Temperature	TLA	538.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.79**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.44**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.22	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.83	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.02	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	534.31	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**6.672**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.176	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.176	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.176	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.176	**-**
ethylbenzene	1.6970	106.17	106	0.25435	0.044737	0.176	**0.25435**
xylenes	4.9749	106.17	106	0.74565	0.131149	0.176	**0.74565**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.176	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.176	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.0611
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9319
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0031
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5801
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1945
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1703
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0941
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054

Monthly Calculations (continued) **AUGUST**

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**6.27**	lb/month
		3.13E-03	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**10,000**	gal/month
Turnovers	N	**10.22**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.16949461	
Partially Insulated	P_{VA}	0.1701771	
Fully Insulated	P_{VA}	0.16105057	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.80	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**537.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.50**	°R
Fully Insulated: TLA = TB	**TLA**	**535.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.66**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.20**	**°R**
Fully Insulated; Tv = TB	**Tv**	**535.80**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.113E-03	
Partially Insulated	Wv	3.123E-03	
Fully Insulated	Wv	2.974E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.11**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0031	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.028	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**4.16**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0031	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1695	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0284**	**per day**
Average Daily Vapor Temperature Range	ΔTv	17.48	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1695	psia
Average Daily Liquid Surface Temperature	TLA	537.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**17.48**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.17**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	541.54	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	533.46	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**6.270**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.169	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.169	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.169	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.169	**-**
ethylbenzene	1.5951	106.17	106	0.25441	0.043122	0.169	**0.25441**
xylenes	4.6746	106.17	106	0.74559	0.126373	0.169	**0.74559**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.169	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.169	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9779
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8760
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9730
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5614
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1875
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1641
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0904
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	4.85	lb/month
		2.42E-03	ton/month
Time Period		September	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1328.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	10,000	gal/month
Turnovers	N	10.56	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.13397983	
Partially Insulated	P_{VA}	0.1344257	
Fully Insulated	P_{VA}	0.12844104	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	527.95	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	528.95	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	530.21	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	530.31	°R
Fully Insulated: TLA = TB	TLA	528.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	531.24	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	531.67	°R
Fully Insulated; Tv = TB	Tv	528.95	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.495E-03	
Partially Insulated	Wv	2.502E-03	
Fully Insulated	Wv	2.402E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	1.51	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0025	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	3.34	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0025	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1340	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0262	per day
Average Daily Vapor Temperature Range	ΔTv	16.09	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1340	psia
Average Daily Liquid Surface Temperature	TLA	530.21	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.09	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	14.74	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.23	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.19	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.99	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.62	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	4.846
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations			Vapor Mole Fraction		
		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.134	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.134	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.134	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.134	-
ethylbenzene	1.2348	106.17	106	0.25480	0.034139	0.134	0.25480
xylenes	3.6113	106.17	106	0.74520	0.099841	0.134	0.74520
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.134	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.134	0.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.4999
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.5573
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8018
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4557
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1484
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1297
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0704
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0038

Monthly Calculations (continued) **OCTOBER**

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	3.23	lb/month
		1.61E-03	ton/month
Time Period		October	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	969.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	10,000	gal/month
Turnovers	N	10.22	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.08901713	
Partially Insulated	P_{VA}	0.08924588	
Fully Insulated	P_{VA}	0.08616321	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	516.65	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.38	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	518.30	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	518.37	°R
Fully Insulated: TLA = TB	TLA	517.4	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	519.05	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	519.36	°R
Fully Insulated; Tv = TB	Tv	517.38	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.697E-03	
Partially Insulated	Wv	1.700E-03	
Fully Insulated	Wv	1.648E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.96	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0017	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.024	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	2.27	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0017	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0890	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0237	per day
Average Daily Vapor Temperature Range	ΔTv	14.44	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0890	psia
Average Daily Liquid Surface Temperature	TLA	518.30	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	14.44	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	13.07	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.91	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	514.69	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	521.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	515.10	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	3.229
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations			Vapor Mole Fraction		
		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.089	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.089	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.089	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.089	-
ethylbenzene	0.8249	106.17	106	0.25545	0.022739	0.089	0.25545
xylenes	2.4043	106.17	106	0.74455	0.066278	0.089	0.74455
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.089	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.089	0.00E+00

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.8452
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.1271
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.5730
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3172
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0989
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0861
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0454
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0022

Monthly Calculations (continued) — NOVEMBER

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	2.13	lb/month
		1.06E-03	ton/month
Time Period		November	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	630.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Gasoline Additive		
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	10,000	gal/month
Turnovers	N	10.56	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06157932	
Partially Insulated	P_{VA}	0.06168743	
Fully Insulated	P_{VA}	0.06022408	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.05	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	507.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	508.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	508.17	°R
Fully Insulated: TLA = TB	TLA	507.5	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	508.61	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	508.81	°R
Fully Insulated; Tv = TB	Tv	507.52	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.198E-03	
Partially Insulated	Wv	1.199E-03	
Fully Insulated	Wv	1.174E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.53	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	1.60	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0616	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0190	per day
Average Daily Vapor Temperature Range	ΔTv	11.76	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0616	psia
Average Daily Liquid Surface Temperature	TLA	508.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	11.76	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	10.53	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.06	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.18	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	510.80	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	505.54	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	2.128

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.062	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.062	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.062	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.062	-
ethylbenzene	0.5447	106.17	106	0.25599	0.015763	0.062	0.25599
xylenes	1.5831	106.17	106	0.74401	0.045816	0.062	0.74401
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.062	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.062	0.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4043
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8425
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4235
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2290
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0685
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0595
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0306
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) — DECEMBER

Tank No.	12		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.48	lb/month
		7.38E-04	ton/month
Time Period		December	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	513.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	Gasoline Additive		
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	10,000	gal/month
Turnovers	N	10.22	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04249522	
Partially Insulated	P_{VA}	0.04255902	
Fully Insulated	P_{VA}	0.04169431	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	497.50	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	497.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	498.37	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	498.41	°R
Fully Insulated: TLA = TB	TLA	497.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	498.77	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	498.94	°R
Fully Insulated; Tv = TB	Tv	497.88	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.429E-04	
Partially Insulated	Wv	8.439E-04	
Fully Insulated	Wv	8.285E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.35	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.017	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	1.13	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,337	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0425	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0173	per day
Average Daily Vapor Temperature Range	ΔTv	10.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0425	psia
Average Daily Liquid Surface Temperature	TLA	498.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	10.69	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	9.53	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	495.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	500.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	496.03	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	1.476

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.042	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.042	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.042	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.042	-
ethylbenzene	0.3785	106.17	106	0.25649	0.010900	0.042	0.25649
xylenes	1.0971	106.17	106	0.74351	0.031596	0.042	0.74351
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.042	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.042	0.00E+00

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0674
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6288
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3125
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1650
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0474
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0410
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0206
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

HT TANK EMISSION CALCULATION

Tank No.	14		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	31.71	lb/year
		0.02	ton/year
Time Period		Annual	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1231.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B	B	0.0	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	11.00	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	13.35	ft
Throughput	Q	96,000	gal/yr
Turnovers	N	8.34	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	11.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	0.00	ft
Liquid height (assume 1/2 H_E)	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.08231444	
Partially Insulated	P_{VA}	0.08258613	
Fully Insulated	P_{VA}	0.07893925	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	514.00	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	514.92	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	516.09	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	516.19	°R
Fully Insulated: TLA = TB	TLA	514.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	517.05	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	517.45	°R
Fully Insulated; Tv = TB	Tv	514.92	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.575E-03	
Partially Insulated	Wv	1.579E-03	
Fully Insulated	Wv	1.517E-03	

Horizontal Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	11.50	lb/yr
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0016	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	20.21	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	12,832	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0016	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0823	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0260	per day
Average Daily Vapor Temperature Range	ΔTv	15.54	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0823	psia
Average Daily Liquid Surface Temperature	TLA	516.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	15.54	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	14.20	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	512.21	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.73	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	512.64	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	31.713	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/yr)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.082	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.082	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.082	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.082	-
ethylbenzene	8.1046	106.17	106	0.25556	0.021037	0.082	0.25556
xylenes	23.6081	106.17	106	0.74444	0.061278	0.082	0.74444
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.082	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.082	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.7412
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.0595
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.5373
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2960
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0915
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0796
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0418
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0020

Monthly Calculations - JANUARY

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.08**	lb/month
		5.42E-04	ton/month
Time Period		**January**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03555179	
Partially Insulated	P_{VA}	0.0356144	
Fully Insulated	P_{VA}	0.03476692	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	493.29	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**493.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**493.89**	°R
Fully Insulated: TLA = TB	**TLA**	**493.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**494.31**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**494.50**	**°R**
Fully Insulated; Tv = TB	**Tv**	**493.29**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.116E-04	
Partially Insulated	Wv	7.126E-04	
Fully Insulated	Wv	6.973E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.32**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0007	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.76**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0007	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0356	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0190**	**per day**
Average Daily Vapor Temperature Range	ΔTv	11.41	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0356	psia
Average Daily Liquid Surface Temperature	TLA	493.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**11.41**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**10.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	496.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	496.44	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	491.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**1.084**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV — **M_i**	**M_V**	**Z_{Vi}**	**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA — **P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.036	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.036	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.036	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.036	**-**
ethylbenzene	0.2782	106.17	106	0.25672	0.009127	0.036	**0.25672**
xylenes	0.8054	106.17	106	0.74328	0.026425	0.036	**0.74328**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.036	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.036	**0.00E+00**

Individual HAPS	**Liquid Mole Fraction** Eq. 40-4 xi = (ZLiML)/Mi — **Z_{Li}**	**M_L**	**M_i**	**X_i**	**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C))) — **A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.9357
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5463
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2700
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1410
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0397
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0343
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0170
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0007

Monthly Calculations (continued) FEBRUARY

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.19**	lb/month
		5.95E-04	ton/month
Time Period		**February**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**9.06**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03828375	
Partially Insulated	P_{VA}	0.03838158	
Fully Insulated	P_{VA}	0.03706329	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.90	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**495.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**495.78**	°R
Fully Insulated: TLA = TB	**TLA**	**494.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**496.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**496.66**	**°R**
Fully Insulated; Tv = TB	**Tv**	**494.90**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.631E-04	
Partially Insulated	Wv	7.646E-04	
Fully Insulated	Wv	7.410E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.37**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.023	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.82**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0383	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0228**	**per day**
Average Daily Vapor Temperature Range	ΔTv	13.34	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0383	psia
Average Daily Liquid Surface Temperature	TLA	495.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**13.34**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**12.05**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	499.05	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.38	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	498.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.77	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**1.191**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV — **M_i**	**M_V**	**Z_{Vi}**	**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA — **P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.038	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.038	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.038	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.038	**-**
ethylbenzene	0.3056	106.17	106	0.25662	0.009825	0.038	**0.25662**
xylenes	0.8853	106.17	106	0.74338	0.028459	0.038	**0.74338**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.038	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.038	**0.00E+00**

Individual HAPS	**Liquid Mole Fraction** Eq. 40-4 xi = (ZLiML)/Mi — **Z_{Li}**	**M_L**	**M_i**	**X_i**	**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C))) — **A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.9882
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5791
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2869
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1505
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0427
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0370
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0184
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) MARCH

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.70**	lb/month
		8.51E-04	ton/month
Time Period		**March**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.05098135	
Partially Insulated	P_{VA}	0.05115265	
Fully Insulated	P_{VA}	0.04885432	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	501.98	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**503.10**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**503.19**	°R
Fully Insulated: TLA = TB	**TLA**	**502.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**504.01**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**504.39**	**°R**
Fully Insulated; Tv = TB	**Tv**	**501.98**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.001E-03	
Partially Insulated	Wv	1.003E-03	
Fully Insulated	Wv	9.629E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.63**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.07**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0010	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0510	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0265**	**per day**
Average Daily Vapor Temperature Range	ΔTv	15.40	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0510	psia
Average Daily Liquid Surface Temperature	TLA	503.10	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**15.40**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.04**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.95	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	499.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	506.69	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	499.68	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**1.703**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.051	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.051	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.051	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.051	-
ethylbenzene	0.4364	106.17	106	0.25625	0.013064	0.051	**0.25625**
xylenes	1.2666	106.17	106	0.74375	0.037918	0.051	**0.74375**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.051	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.051	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.2212
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7258
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3627
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1938
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0568
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0492
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0250
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0011

Monthly Calculations (continued) APRIL

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.56**	lb/month
		1.28E-03	ton/month
Time Period		**April**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.07493163	
Partially Insulated	P_{VA}	0.07524024	
Fully Insulated	P_{VA}	0.07111625	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	512.04	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.48**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.59**	°R
Fully Insulated: TLA = TB	**TLA**	**512.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.65**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.14**	**°R**
Fully Insulated; Tv = TB	**Tv**	**512.04**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.440E-03	
Partially Insulated	Wv	1.445E-03	
Fully Insulated	Wv	1.374E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.02**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.54**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0014	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0749	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0306**	**per day**
Average Daily Vapor Temperature Range	ΔTv	17.80	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0749	psia
Average Daily Liquid Surface Temperature	TLA	513.48	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**17.80**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.34**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	517.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	509.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	517.68	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	509.51	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**2.557**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.075	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.6538	106.17	106	0.25570	0.019160	0.075	**0.25570**
xylenes	1.9030	106.17	106	0.74430	0.055771	0.075	**0.74430**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.075	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.6240
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9837
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4974
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2724
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0833
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0724
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0378
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018

Monthly Calculations (continued) MAY

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.66**	lb/month
		1.83E-03	ton/month
Time Period		**May**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10523837	
Partially Insulated	P_{VA}	0.10571874	
Fully Insulated	P_{VA}	0.09931446	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	521.42	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**523.09**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**523.22**	°R
Fully Insulated: TLA = TB	**TLA**	**521.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**524.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**525.03**	**°R**
Fully Insulated; Tv = TB	**Tv**	**521.42**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.985E-03	
Partially Insulated	Wv	1.992E-03	
Fully Insulated	Wv	1.884E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.54**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0020	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.033	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0020	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0325**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.16	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1052	psia
Average Daily Liquid Surface Temperature	TLA	523.09	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.16**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.68**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	527.88	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	518.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	527.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	518.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**3.663**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAI}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.105	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.105	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.105	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.105	-
ethylbenzene	0.9348	106.17	106	0.25519	0.026856	0.105	**0.25519**
xylenes	2.7283	106.17	106	0.74481	0.078383	0.105	**0.74481**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.105	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.105	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0893
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2865
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6575
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3679
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1168
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0544
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) JUNE

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.94**	lb/month
		2.47E-03	ton/month
Time Period		**June**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.14734433	
Partially Insulated	P_{VA}	0.14803618	
Fully Insulated	P_{VA}	0.13881809	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.27	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**533.08**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**533.22**	°R
Fully Insulated: TLA = TB	**TLA**	**531.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**534.55**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**535.16**	**°R**
Fully Insulated; Tv = TB	**Tv**	**531.27**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.727E-03	
Partially Insulated	Wv	2.737E-03	
Fully Insulated	Wv	2.585E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.03**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0027	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.92**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0027	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1473	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0322**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.36	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1473	psia
Average Daily Liquid Surface Temperature	TLA	533.08	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.36**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.95**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	537.92	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.24	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	537.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	528.73	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**4.943**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAI}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.147	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.147	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.147	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.147	-
ethylbenzene	1.2588	106.17	106	0.25465	0.037521	0.147	**0.25465**
xylenes	3.6844	106.17	106	0.74535	0.109823	0.147	**0.74535**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.147	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.147	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.6831
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.6791
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8671
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4958
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1631
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1426
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0779
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0043

Monthly Calculations (continued) — JULY

Tank No. 14

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	5.81	lb/month
		2.91E-03	ton/month
Time Period		July	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1867.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	8,000	gal/month
Turnovers	N	8.18	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.17588603	
Partially Insulated	P_{VA}	0.17667803	
Fully Insulated	P_{VA}	0.16611413	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	535.35	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	536.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	538.52	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	538.66	°R
Fully Insulated: TLA = TB	TLA	536.8	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	539.97	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	540.58	°R
Fully Insulated; Tv = TB	Tv	536.75	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.223E-03	
Partially Insulated	Wv	3.234E-03	
Fully Insulated	Wv	3.062E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	2.36	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0032	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	3.45	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0032	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1759	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0307	per day
Average Daily Vapor Temperature Range	ΔTv	18.79	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1759	psia
Average Daily Liquid Surface Temperature	TLA	538.52	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	18.79	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	17.44	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.22	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.83	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.02	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	534.31	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	5.810
Eq. 40-2 L_{Ti} =$Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.176	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.176	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.176	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.176	-
ethylbenzene	1.4779	106.17	106	0.25435	0.044737	0.176	**0.25435**
xylenes	4.3325	106.17	106	0.74565	0.131149	0.176	**0.74565**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.176	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.176	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.0611
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9319
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0031
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5801
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1945
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1703
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0941
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054

Monthly Calculations (continued) — AUGUST

Tank No. 14

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	5.44	lb/month
		2.72E-03	ton/month
Time Period		August	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1661.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	8,000	gal/month
Turnovers	N	8.18	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.16949461	
Partially Insulated	P_{VA}	0.1701771	
Fully Insulated	P_{VA}	0.16105057	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	534.55	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.80	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	537.37	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	537.50	°R
Fully Insulated: TLA = TB	TLA	535.8	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	538.66	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	539.20	°R
Fully Insulated; Tv = TB	Tv	535.80	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.113E-03	
Partially Insulated	Wv	3.123E-03	
Fully Insulated	Wv	2.974E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	2.11	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0031	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.028	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	3.33	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0031	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1695	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0284	per day
Average Daily Vapor Temperature Range	ΔTv	17.48	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1695	psia
Average Daily Liquid Surface Temperature	TLA	537.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	17.48	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	16.17	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.74	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	533.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	541.54	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	533.46	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	5.437
Eq. 40-2 L_{Ti} =$Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.169	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.169	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.169	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.169	-
ethylbenzene	1.3834	106.17	106	0.25441	0.043122	0.169	**0.25441**
xylenes	4.0541	106.17	106	0.74559	0.126373	0.169	**0.74559**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.169	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.169	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9779
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8760
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9730
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5614
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1875
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1641
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0904
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0051

Monthly Calculations (continued) — **SEPTEMBER**

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.18**	lb/month
		2.09E-03	ton/month
Time Period		**September**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.13397983	
Partially Insulated	P_{VA}	0.1344257	
Fully Insulated	P_{VA}	0.12844104	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	528.95	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**530.21**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**530.31**	°R
Fully Insulated: TLA = TB	**TLA**	**528.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**531.24**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**531.67**	**°R**
Fully Insulated; Tv = TB	**Tv**	**528.95**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.495E-03	
Partially Insulated	Wv	2.502E-03	
Fully Insulated	Wv	2.402E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.51**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0025	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.026	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.67**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0025	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1340	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0262**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.09	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1340	psia
Average Daily Liquid Surface Temperature	TLA	530.21	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.09**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**14.74**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.23	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	526.19	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.99	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	526.62	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**4.179**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.134	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.134	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.134	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.134	-
ethylbenzene	1.0648	106.17	106	0.25480	0.034139	0.134	**0.25480**
xylenes	3.1142	106.17	106	0.74520	0.099841	0.134	**0.74520**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.134	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.134	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.4999
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.5573
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8018
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4557
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1484
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1297
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0704
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0038

Monthly Calculations (continued) — **OCTOBER**

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.78**	lb/month
		1.39E-03	ton/month
Time Period		**October**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**White**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.25**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.08901713	
Partially Insulated	P_{VA}	0.08924588	
Fully Insulated	P_{VA}	0.08616321	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.38	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**518.30**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**518.37**	°R
Fully Insulated: TLA = TB	**TLA**	**517.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**519.05**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**519.36**	**°R**
Fully Insulated; Tv = TB	**Tv**	**517.38**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.697E-03	
Partially Insulated	Wv	1.700E-03	
Fully Insulated	Wv	1.648E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.96**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0017	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.024	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.81**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0017	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0890	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0237**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.44	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0890	psia
Average Daily Liquid Surface Temperature	TLA	518.30	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**14.44**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.07**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.91	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	514.69	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	521.64	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	515.10	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**2.776**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.089	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.089	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.089	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.089	-
ethylbenzene	0.7090	106.17	106	0.25545	0.022739	0.089	**0.25545**
xylenes	2.0665	106.17	106	0.74455	0.066278	0.089	**0.74455**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.089	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.089	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.8452
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.1271
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.5730
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3172
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0989
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0861
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0454
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0022

Monthly Calculations (continued) — NOVEMBER

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.81	lb/month
		9.04E-04	ton/month
Time Period		November	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	630.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	8,000	gal/month
Turnovers	N	8.45	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06157932	
Partially Insulated	P_{VA}	0.06168743	
Fully Insulated	P_{VA}	0.06022408	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.05	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	507.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	508.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	508.17	°R
Fully Insulated: TLA = TB	TLA	507.5	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	508.61	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	508.81	°R
Fully Insulated; Tv = TB	Tv	507.52	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.198E-03	
Partially Insulated	Wv	1.199E-03	
Fully Insulated	Wv	1.174E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.53	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.019	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	1.28	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0616	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0190	per day
Average Daily Vapor Temperature Range	ΔTv	11.76	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0616	psia
Average Daily Liquid Surface Temperature	TLA	508.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	11.76	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	10.53	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	511.06	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.18	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	510.80	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	505.54	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	1.808	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.062	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.062	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.062	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.062	-
ethylbenzene	0.4627	106.17	106	0.25599	0.015763	0.062	0.25599
xylenes	1.3449	106.17	106	0.74401	0.045816	0.062	0.74401
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.062	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.062	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4043
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8425
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4235
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2290
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0685
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0595
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0306
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) — DECEMBER

Tank No.	14		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.25	lb/month
		6.25E-04	ton/month
Time Period		December	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	513.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	11.00	ft
Diameter	D	13.35	ft
Throughput	Q	8,000	gal/month
Turnovers	N	8.18	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	10.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		White	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.25	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04249522	
Partially Insulated	P_{VA}	0.04255902	
Fully Insulated	P_{VA}	0.04169431	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	497.50	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	497.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	498.37	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	498.41	°R
Fully Insulated: TLA = TB	TLA	497.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	498.77	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	498.94	°R
Fully Insulated; Tv = TB	Tv	497.88	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.429E-04	
Partially Insulated	Wv	8.439E-04	
Fully Insulated	Wv	8.285E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.35	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.017	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.90	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0425	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0173	per day
Average Daily Vapor Temperature Range	ΔTv	10.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0425	psia
Average Daily Liquid Surface Temperature	TLA	498.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	10.69	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	9.53	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	495.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	500.79	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.03	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	1.250	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.042	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.042	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.042	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.042	-
ethylbenzene	0.3207	106.17	106	0.25649	0.010900	0.042	0.25649
xylenes	0.9295	106.17	106	0.74351	0.031596	0.042	0.74351
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.042	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.042	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0674
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6288
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3125
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1650
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0474
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0410
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0206
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

HT TANK EMISSION CALCULATION

Tank No.	15		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**58.28**	lb/year
		0.03	ton/year
Time Period		**Annual**	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B	B	**0.0**	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	**16.76**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**14.74**	ft
Throughput	Q	**12,000**	gal/yr
Turnovers	N	**0.56**	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**16.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.09970806	
Partially Insulated	P_{VA}	0.10086613	
Fully Insulated	P_{VA}	0.08600118	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.32	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**521.53**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**521.87**	°R
Fully Insulated: TLA = TB	**TLA**	**517.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**524.97**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**526.41**	**°R**
Fully Insulated; Tv = TB	**Tv**	**517.32**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.879E-03	
Partially Insulated	Wv	1.896E-03	
Fully Insulated	Wv	1.645E-03	

Horizontal Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**55.27**	lb/yr
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0019	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.056	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.01**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,604	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0019	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0997	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0564**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.54	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0997	psia
Average Daily Liquid Surface Temperature	TLA	521.53	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.54**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**30.20**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	529.42	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	513.65	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	529.42	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	514.32	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	**58.281**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.100	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.100	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.100	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.100	**-**
ethylbenzene	14.8775	106.17	106	0.25527	0.025453	0.100	**0.25527**
xylenes	43.4033	106.17	106	0.74473	0.074255	0.100	**0.74473**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.100	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.100	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0073
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.2328
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6290
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3507
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1107
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0964
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0513
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0026

Monthly Calculations - JANUARY

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.29**	lb/month
		6.47E-04	ton/month
	Time Period	**January**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	^oR
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**1,000**	gal/month
Turnovers	N	**0.55**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03940991	
Partially Insulated	P_{VA}	0.03965696	
Fully Insulated	P_{VA}	0.03639459	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	^oR
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	^oR
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	^oR
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.44	^oR
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**496.45**	^oR
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**496.61**	^oR
Fully Insulated: TLA = TB	**TLA**	**494.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**498.09**	^oR
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**498.78**	^oR
Fully Insulated; Tv = TB	**Tv**	**494.44**	^oR
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.828E-04	
Partially Insulated	Wv	7.866E-04	
Fully Insulated	Wv	7.283E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.19**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.034	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.10**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0394	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0343**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.05	^oR
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0394	psia
Average Daily Liquid Surface Temperature	TLA	496.45	^oR
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	^oR
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.05**	^oR
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**17.84**	^oR
Fully Insulated, constant temperature	**ΔTv**	**0.00**	^oR
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.21	^oR
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.69	^oR
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	501.07	^oR
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.15	^oR
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	1.294	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.039	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.039	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.039	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.039	-
ethylbenzene	0.3321	106.17	106	0.25659	0.010112	0.039	**0.25659**
xylenes	0.9621	106.17	106	0.74341	0.029298	0.039	**0.74341**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.039	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.039	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0096
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5925
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2938
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1544
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0440
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0380
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0190
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) **FEBRUARY**

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.70**	lb/month
		8.48E-04	ton/month
	Time Period	**February**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	^oR
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**1,000**	gal/month
Turnovers	N	**0.61**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04443357	
Partially Insulated	P_{VA}	0.04483557	
Fully Insulated	P_{VA}	0.03960609	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	^oR
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	^oR
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	^oR
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.57	^oR
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.52**	^oR
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.75**	^oR
Fully Insulated: TLA = TB	**TLA**	**496.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.92**	^oR
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**502.93**	^oR
Fully Insulated; Tv = TB	**Tv**	**496.57**	^oR
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.759E-04	
Partially Insulated	Wv	8.820E-04	
Fully Insulated	Wv	7.891E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.58**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.045	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0444	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0450**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.53	^oR
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0444	psia
Average Daily Liquid Surface Temperature	TLA	499.52	^oR
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	^oR
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.53**	^oR
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.24**	^oR
Fully Insulated, constant temperature	**ΔTv**	**0.00**	^oR
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.65	^oR
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	493.39	^oR
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.56	^oR
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.94	^oR
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	1.695	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.044	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.4347	106.17	106	0.25643	0.011394	0.044	**0.25643**
xylenes	1.2604	106.17	106	0.74357	0.033039	0.044	**0.74357**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.044	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1032
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6513
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3241
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1717
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0495
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0429
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0216
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

Monthly Calculations (continued) **MARCH**

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.15**	lb/month
		1.57E-03	ton/month
Time Period		**March**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**1,000**	gal/month
Turnovers	N	**0.55**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06196905	
Partially Insulated	P_{VA}	0.06270207	
Fully Insulated	P_{VA}	0.05330671	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	504.27	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.29**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**508.61**	°R
Fully Insulated: TLA = TB	**TLA**	**504.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**511.57**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**512.94**	**°R**
Fully Insulated; Tv = TB	**Tv**	**504.27**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.198E-03	
Partially Insulated	Wv	1.209E-03	
Fully Insulated	Wv	1.046E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.99**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.056	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.16**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0620	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0562**	**per day**
Average Daily Vapor Temperature Range	ΔTv	30.67	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0620	psia
Average Daily Liquid Surface Temperature	TLA	508.29	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**30.67**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.31**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	515.96	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	500.62	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	515.94	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	501.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**3.147**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	P_i = P_{VAi}(x_i)	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.062	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.062	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.062	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.062	-
ethylbenzene	0.8057	106.17	106	0.25598	0.015863	0.062	**0.25598**
xylenes	2.3418	106.17	106	0.74402	0.046106	0.062	**0.74402**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.062	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.062	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4109
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8467
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4257
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2303
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0690
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0599
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0308
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) **APRIL**

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.47**	lb/month
		2.74E-03	ton/month
Time Period		**April**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**1,000**	gal/month
Turnovers	N	**0.57**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.09510192	
Partially Insulated	P_{VA}	0.09647278	
Fully Insulated	P_{VA}	0.07913772	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	514.99	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**520.59**	°R
Fully Insulated: TLA = TB	**TLA**	**515.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**524.41**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**526.18**	**°R**
Fully Insulated; Tv = TB	**Tv**	**514.99**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.794E-03	
Partially Insulated	Wv	1.814E-03	
Fully Insulated	Wv	1.520E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**5.23**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0018	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.068	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.24**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0018	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0951	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0680**	**per day**
Average Daily Vapor Temperature Range	ΔTv	37.51	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0951	psia
Average Daily Liquid Surface Temperature	TLA	520.18	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**37.51**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**36.05**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	529.55	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	510.80	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	529.60	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	511.58	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**5.473**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	P_i = P_{VAi}(x_i)	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.095	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.095	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.095	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.095	-
ethylbenzene	1.3974	106.17	106	0.25535	0.024284	0.095	**0.25535**
xylenes	4.0752	106.17	106	0.74465	0.070818	0.095	**0.74465**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.095	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.095	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.9380
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.1875
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6050
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3363
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1056
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0920
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0488
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0024

Monthly Calculations (continued) — MAY

Tank No.	15						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**8.42**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**8.75**	lb/month	Vapor Space Volume	Vv	1429.8	ft3
		4.38E-03	ton/month	Stock Vapor Density	Wv	0.0025	lb/ft3
Time Period		**May**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.075	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft²-day	Constant: Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.34**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Product Type		**Gasoline Additive**		Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0025	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1370	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**16.76**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0751**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	42.04	°R
Throughput	Q	**1,000**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**0.55**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1370	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	530.87	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**42.04**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**40.56**	°R
Tank Shell Color (pick from drop down list)		**Green, dark**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = expl	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	541.38	°R
Not Insulated	P_{VA}	0.13697467		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.36	°R
Partially Insulated	P_{VA}	0.13915441					
Fully Insulated	P_{VA}	0.11180036		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R	Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	541.49	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	521.21	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.85	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**1,429.77**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**530.87**	°R	Effective Tank diameter	D_E	14.74	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**531.35**	°R	Effective Tank Height	H_E	16.76	ft
Fully Insulated: TLA = TB	**TLA**	**524.9**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**535.78**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**537.84**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**524.85**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.529E-03					
Partially Insulated	Wv	2.560E-03					
Fully Insulated	Wv	2.108E-03					

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**8.754**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.137	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.137	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.137	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.137	-
ethylbenzene	2.2301	106.17	106	0.25477	0.034897	0.137	**0.25477**
xylenes	6.5235	106.17	106	0.74523	0.102078	0.137	**0.74523**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.137	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.137	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.5414
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.5848
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8165
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4647
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1517
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1326
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0720
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0039

Monthly Calculations (continued) — JUNE

Tank No.	15						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**11.57**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**12.04**	lb/month	Vapor Space Volume	Vv	1429.8	ft3
		6.02E-03	ton/month	Stock Vapor Density	Wv	0.0035	lb/ft3
Time Period		**June**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.077	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft²-day	Constant: Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.47**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Product Type		**Gasoline Additive**		Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0035	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1932	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**16.76**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0772**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	44.03	°R
Throughput	Q	**1,000**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**0.57**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1932	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	541.47	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**44.03**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**42.62**	°R
Tank Shell Color (pick from drop down list)		**Green, dark**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = expl	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	552.47	°R
Not Insulated	P_{VA}	0.19317968		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	530.46	°R
Partially Insulated	P_{VA}	0.19633616					
Fully Insulated	P_{VA}	0.15680084		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R	Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	552.63	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	531.32	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.97	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**1,429.77**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**541.47**	°R	Effective Tank diameter	D_E	14.74	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**541.98**	°R	Effective Tank Height	H_E	16.76	ft
Fully Insulated: TLA = TB	**TLA**	**535.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**546.76**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**548.98**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**534.97**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.496E-03					
Partially Insulated	Wv	3.538E-03					
Fully Insulated	Wv	2.900E-03					

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**12.040**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.193	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.193	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.193	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.193	-
ethylbenzene	3.0604	106.17	106	0.25419	0.049104	0.193	**0.25419**
xylenes	8.9794	106.17	106	0.74581	0.144076	0.193	**0.74581**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.193	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.193	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.2826
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.0809
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0836
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.6305
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2135
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1871
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1040
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0061

Monthly Calculations (continued) **JULY**

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**14.06**	lb/month
		7.03E-03	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**1,000**	gal/month
Turnovers	N	**0.55**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.22809053	
Partially Insulated	P_{VA}	0.23166781	
Fully Insulated	P_{VA}	0.18669981	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	540.39	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**546.78**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**547.28**	°R
Fully Insulated: TLA = TB	**TLA**	**540.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**551.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**554.17**	**°R**
Fully Insulated; Tv = TB	**Tv**	**540.39**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.088E-03	
Partially Insulated	Wv	4.136E-03	
Fully Insulated	Wv	3.418E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**13.52**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0041	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.075	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.55**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0041	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2281	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0746**	**per day**
Average Daily Vapor Temperature Range	ΔTv	43.06	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2281	psia
Average Daily Liquid Surface Temperature	TLA	546.78	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**43.06**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**41.71**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	557.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	536.01	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	557.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	536.85	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**14.063**

Vapor Weight Concentrations Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.228	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.228	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.228	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.228	-
ethylbenzene	3.5706	106.17	106	0.25390	0.057912	0.228	**0.25390**
xylenes	10.4926	106.17	106	0.74610	0.170179	0.228	**0.74610**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.228	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.228	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.7153
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.3738
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7308
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2518
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2210
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1241
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0075

Monthly Calculations (continued) **AUGUST**

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**12.06**	lb/month
		6.03E-03	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**1,000**	gal/month
Turnovers	N	**0.55**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Green, dark**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.21395249	
Partially Insulated	P_{VA}	0.21696385	
Fully Insulated	P_{VA}	0.17878993	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	539.03	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**544.72**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**545.16**	°R
Fully Insulated: TLA = TB	**TLA**	**539.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**549.35**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**551.29**	**°R**
Fully Insulated; Tv = TB	**Tv**	**539.03**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.853E-03	
Partially Insulated	Wv	3.894E-03	
Fully Insulated	Wv	3.282E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**11.54**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0039	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.068	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.52**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0039	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2140	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0676**	**per day**
Average Daily Vapor Temperature Range	ΔTv	39.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2140	psia
Average Daily Liquid Surface Temperature	TLA	544.72	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**39.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**37.76**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	554.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	534.95	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	554.60	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	535.72	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**12.056**

Vapor Weight Concentrations Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.214	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.214	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.214	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.214	-
ethylbenzene	3.0623	106.17	106	0.25401	0.054346	0.214	**0.25401**
xylenes	8.9936	106.17	106	0.74599	0.159606	0.214	**0.74599**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.214	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.214	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.5422
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.2564
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.1787
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.6904
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2363
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2073
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1159
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0069

Monthly Calculations (continued) SEPTEMBER

Tank No.	15						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**7.42**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**7.82**	lb/month	Vapor Space Volume	Vv	1429.8	ft3
		3.91E-03	ton/month	Stock Vapor Density	Wv	0.0030	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.058	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.40**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Product Type	**Gasoline Additive**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0030	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1625	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**16.76**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0581**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	33.35	°R
Throughput	Q	**1,000**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**0.57**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1625	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	536.08	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**33.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**32.00**	°R
Tank Shell Color (pick from drop down list)		**Green, dark**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.42	°R
Not Insulated	P_{VA}	0.16253055		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	527.74	°R
Partially Insulated	P_{VA}	0.16443178					
Fully Insulated	P_{VA}	0.14003052		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R	Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.44	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	528.43	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.54	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**1,429.77**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.08**	°R	Effective Tank diameter	D_E	14.74	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.44**	°R	Effective Tank Height	H_E	16.76	ft
Fully Insulated: TLA = TB	**TLA**	**531.5**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.78**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**541.34**	**°R**				
Fully Insulated: Tv = TB	**Tv**	**531.54**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.979E-03					
Partially Insulated	Wv	3.005E-03					
Fully Insulated	Wv	2.606E-03					

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**7.820**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.163	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.163	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.163	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.163	-
ethylbenzene	1.9902	106.17	106	0.25448	0.041361	0.163	**0.25448**
xylenes	5.8303	106.17	106	0.74552	0.121169	0.163	**0.74552**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.163	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.163	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.8863
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8147
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9399
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5408
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1798
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1574
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0865
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0049

Monthly Calculations (continued) OCTOBER

Tank No.	15						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**4.11**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.37**	lb/month	Vapor Space Volume	Vv	1429.8	ft3
		2.18E-03	ton/month	Stock Vapor Density	Wv	0.0019	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.048	per day
Nearest US Location	**New York-Kennedy, NY**			Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.68	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.26**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Product Type	**Gasoline Additive**			Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.24**	lb/gal	Stock Vapor Density	Wv	0.0019	lb/ft3
Average Reid Vapor Pressure	RVP	**0.00**		Vent Setting Correction Factor	KB	1.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**					
Vapor Pressure Equation Constant A	A	**0.00**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1034	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**16.76**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0476**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	27.03	°R
Throughput	Q	**1,000**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**0.55**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Roof Type:		**0.00**		Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1034	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	522.58	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.68	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**27.03**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**25.66**	°R
Tank Shell Color (pick from drop down list)		**Green, dark**		**Fully Insulated, constant temperature**	**ΔTv**	**0.00**	°R
Tank Shell Condition (pick from drop down list)		**Average**					
Tank Interior Condition (pick from drop down list)		**Light Rust**		**Average Daily Vapor Pressure Range (ΔPv)**			
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.9**		**Not Insulated - Equation 1-9: ΔPV = PVX - PVN**	ΔPv	**0.00000**	psia
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi	Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	529.34	°R
Not Insulated	P_{VA}	0.10339386		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.82	°R
Partially Insulated	P_{VA}	0.1043334					
Fully Insulated	P_{VA}	0.09210901		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00000**	**psia**
				Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R	Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	529.26	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.43	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	519.27	°R	**Fully Insulated (ΔPv = 0)**	**ΔPv**	**0.00**	**psia**
Average Daily Liquid Surface Temperature (TLA)				**Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo**	**Vv**	**1,429.77**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**522.58**	°R	Effective Tank diameter	D_E	14.74	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**522.84**	°R	Effective Tank Height	H_E	16.76	ft
Fully Insulated: TLA = TB	**TLA**	**519.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.28**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**526.42**	**°R**				
Fully Insulated: Tv = TB	**Tv**	**519.27**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.947E-03					
Partially Insulated	Wv	1.961E-03					
Fully Insulated	Wv	1.755E-03					

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**4.370**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.103	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.103	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.103	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.103	-
ethylbenzene	1.1153	106.17	106	0.25522	0.026388	0.103	**0.25522**
xylenes	3.2547	106.17	106	0.74478	0.077006	0.103	**0.74478**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.103	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.103	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0621
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2687
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6480
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3622
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1147
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1000
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0533
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0027

Monthly Calculations (continued) NOVEMBER

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	2.15	lb/month
		1.07E-03	ton/month
Time Period		November	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	630.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	16.76	ft
Diameter	D	14.74	ft
Throughput	Q	1,000	gal/month
Turnovers	N	0.57	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	15.76	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	8.38	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Green, dark	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.9	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06823793	
Partially Insulated	P_{VA}	0.06866412	
Fully Insulated	P_{VA}	0.06303435	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.05	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.75	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	510.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	511.08	°R
Fully Insulated: TLA = TB	TLA	508.8	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	512.66	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	513.40	°R
Fully Insulated; Tv = TB	Tv	508.75	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.317E-03	
Partially Insulated	Wv	1.323E-03	
Fully Insulated	Wv	1.226E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	1.97	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0013	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.035	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.18	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0013	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0682	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0349	per day
Average Daily Vapor Temperature Range	ΔTv	19.95	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0682	psia
Average Daily Liquid Surface Temperature	TLA	510.91	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	19.95	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	18.72	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	515.89	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.92	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	515.76	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	506.40	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	1,429.77	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	2.150	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.068	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.068	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.068	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.068	-
ethylbenzene	0.5500	106.17	106	0.25584	0.017458	0.068	0.25584
xylenes	1.5998	106.17	106	0.74416	0.050780	0.068	0.74416
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.068	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.068	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.5152
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9136
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4607
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2507
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0759
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0659
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0342
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0016

Monthly Calculations (continued) DECEMBER

Tank No.	15		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.36	lb/month
		6.80E-04	ton/month
Time Period		December	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	513.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	16.76	ft
Diameter	D	14.74	ft
Throughput	Q	1,000	gal/month
Turnovers	N	0.55	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	15.76	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	8.38	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Green, dark	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.9	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04640001	
Partially Insulated	P_{VA}	0.04664833	
Fully Insulated	P_{VA}	0.0433527	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	497.50	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.89	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	500.64	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	500.78	°R
Fully Insulated: TLA = TB	TLA	498.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.07	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	502.67	°R
Fully Insulated; Tv = TB	Tv	498.89	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.144E-04	
Partially Insulated	Wv	9.182E-04	
Fully Insulated	Wv	8.598E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	1.24	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.031	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.12	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	134	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0464	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0306	per day
Average Daily Vapor Temperature Range	ΔTv	17.35	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0464	psia
Average Daily Liquid Surface Temperature	TLA	500.64	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	17.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	16.19	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	504.98	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.30	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	504.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	496.73	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	1,429.77	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	1.361	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.046	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.046	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.046	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.046	-
ethylbenzene	0.3489	106.17	106	0.25637	0.011896	0.046	0.25637
xylenes	1.0120	106.17	106	0.74363	0.034504	0.046	0.74363
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.046	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.046	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1391
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6739
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3358
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1784
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0517
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0448
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0226
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010

HT TANK EMISSION CALCULATION

Tank No.	20		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**60.46**	lb/year
		0.03	ton/year
Time Period		**Annual**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B	B	**0.0**	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	**16.76**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**14.74**	ft
Throughput	Q	**3,600**	gal/yr
Turnovers	N	**0.17**	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**16.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10175748	
Partially Insulated	P_{VA}	0.10302818	
Fully Insulated	P_{VA}	0.08679324	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**522.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**522.48**	°R
Fully Insulated: TLA = TB	**TLA**	**517.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.82**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.37**	**°R**
Fully Insulated; Tv = TB	**Tv**	**517.58**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.915E-03	
Partially Insulated	Wv	1.933E-03	
Fully Insulated	Wv	1.659E-03	

Horizontal Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**59.54**	lb/yr
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0019	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.060	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.92**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0019	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1018	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0596**	**per day**
Average Daily Vapor Temperature Range	ΔTv	33.26	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1018	psia
Average Daily Liquid Surface Temperature	TLA	522.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**33.26**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**31.92**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.44	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	513.80	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.46	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	514.50	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	**60.462**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.102	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.102	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.102	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.102	-
ethylbenzene	15.4324	106.17	106	0.25524	0.025973	0.102	**0.25524**
xylenes	45.0297	106.17	106	0.74476	0.075785	0.102	**0.74476**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.102	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.102	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0378
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.2528
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6396
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3571
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1129
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0984
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0524
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0027

Monthly Calculations - JANUARY

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	20		
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.29**	lb/month
		6.45E-04	ton/month
Time Period		**January**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03984635	
Partially Insulated	P_{VA}	0.04011524	
Fully Insulated	P_{VA}	0.03657378	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.56	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**496.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**496.90**	°R
Fully Insulated: TLA = TB	**TLA**	**494.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**498.50**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**499.24**	**°R**
Fully Insulated; Tv = TB	**Tv**	**494.56**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.908E-04	
Partially Insulated	Wv	7.950E-04	
Fully Insulated	Wv	7.317E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.26**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.036	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.03**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0398	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0359**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.88	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0398	psia
Average Daily Liquid Surface Temperature	TLA	496.73	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.88**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.67**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.76	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	501.57	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.23	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**1.291**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.040	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.040	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.040	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.040	-
ethylbenzene	0.3312	106.17	106	0.25657	0.010224	0.040	**0.25657**
xylenes	0.9596	106.17	106	0.74343	0.029623	0.040	**0.74343**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.040	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.040	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0179
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5977
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2964
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1559
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0445
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0385
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0192
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) **FEBRUARY**

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	20		
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.72**	lb/month
		8.61E-04	ton/month
Time Period		**February**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04514441	
Partially Insulated	P_{VA}	0.04558384	
Fully Insulated	P_{VA}	0.03988878	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.76	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.93**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**500.18**	°R
Fully Insulated: TLA = TB	**TLA**	**496.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.52**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.60**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.76**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.888E-04	
Partially Insulated	Wv	8.955E-04	
Fully Insulated	Wv	7.945E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.69**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.04**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0451	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0474**	**per day**
Average Daily Vapor Temperature Range	ΔTv	25.73	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0451	psia
Average Daily Liquid Surface Temperature	TLA	499.93	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**25.73**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.44**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.36	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	493.50	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	506.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	494.07	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**1.721**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.045	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.045	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.045	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.045	-
ethylbenzene	0.4414	106.17	106	0.25641	0.011575	0.045	**0.25641**
xylenes	1.2800	106.17	106	0.74359	0.033569	0.045	**0.74359**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.045	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.045	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1162
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6595
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3283
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1741
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0503
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0436
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0220
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

Monthly Calculations (continued) MARCH

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.27**	lb/month
		1.63E-03	ton/month
Time Period		**March**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06326638	
Partially Insulated	P_{VA}	0.06407103	
Fully Insulated	P_{VA}	0.05380656	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	504.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**509.19**	°R
Fully Insulated: TLA = TB	**TLA**	**504.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**512.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**513.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**504.52**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.222E-03	
Partially Insulated	Wv	1.234E-03	
Fully Insulated	Wv	1.055E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.22**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.059	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.05**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0633	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0594**	**per day**
Average Daily Vapor Temperature Range	ΔTv	32.32	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0633	psia
Average Daily Liquid Surface Temperature	TLA	508.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.32**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**30.96**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	516.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	500.77	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	516.93	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	501.45	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**3.265**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.063	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.063	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.063	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.063	-
ethylbenzene	0.8358	106.17	106	0.25595	0.016193	0.063	**0.25595**
xylenes	2.4296	106.17	106	0.74405	0.047074	0.063	**0.74405**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.063	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.063	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4327
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8606
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4330
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2345
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0704
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0611
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0315
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) APRIL

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.74**	lb/month
		2.87E-03	ton/month
Time Period		**April**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.09753012	
Partially Insulated	P_{VA}	0.09904076	
Fully Insulated	P_{VA}	0.08004645	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	515.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.90**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**521.34**	°R
Fully Insulated: TLA = TB	**TLA**	**515.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.37**	**°R**
Fully Insulated; Tv = TB	**Tv**	**515.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.836E-03	
Partially Insulated	Wv	1.858E-03	
Fully Insulated	Wv	1.537E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**5.67**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0018	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.072	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.07**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0018	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0975	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0720**	**per day**
Average Daily Vapor Temperature Range	ΔTv	39.63	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0975	psia
Average Daily Liquid Surface Temperature	TLA	520.90	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**39.63**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**38.17**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.81	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	510.99	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.88	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	511.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**5.742**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.098	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.098	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.098	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.098	-
ethylbenzene	1.4660	106.17	106	0.25531	0.024900	0.098	**0.25531**
xylenes	4.2762	106.17	106	0.74469	0.072630	0.098	**0.74469**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.098	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.098	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.9746
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2114
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6176
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3439
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1083
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0943
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0501
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0025

Monthly Calculations (continued) **MAY**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**9.26**	lb/month
		4.63E-03	ton/month
Time Period		**May**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.14083743	
Partially Insulated	P_{VA}	0.14324467	
Fully Insulated	P_{VA}	0.11322224	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	525.22	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**531.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**532.22**	°R
Fully Insulated: TLA = TB	**TLA**	**525.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**537.00**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.22**	**°R**
Fully Insulated; Tv = TB	**Tv**	**525.22**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.595E-03	
Partially Insulated	Wv	2.628E-03	
Fully Insulated	Wv	2.133E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**9.15**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0026	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.080	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.10**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0026	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1408	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0796**	**per day**
Average Daily Vapor Temperature Range	ΔTv	44.50	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1408	psia
Average Daily Liquid Surface Temperature	TLA	531.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**44.50**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**43.02**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	542.83	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.58	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	542.98	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	521.47	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**9.256**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.141	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.141	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.141	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.141	**-**
ethylbenzene	2.3576	106.17	106	0.25472	0.035874	0.141	**0.25472**
xylenes	6.8981	106.17	106	0.74528	0.104963	0.141	**0.74528**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.141	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.141	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.5945
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.6201
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8354
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4763
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1560
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1363
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0742
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0040

Monthly Calculations (continued) **JUNE**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**12.76**	lb/month
		6.38E-03	ton/month
Time Period		**June**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.198774	
Partially Insulated	P_{VA}	0.20226181	
Fully Insulated	P_{VA}	0.15885147	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.37	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**542.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**542.92**	°R
Fully Insulated: TLA = TB	**TLA**	**535.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**548.08**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**550.47**	**°R**
Fully Insulated; Tv = TB	**Tv**	**535.37**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.588E-03	
Partially Insulated	Wv	3.635E-03	
Fully Insulated	Wv	2.936E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.61**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0036	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.082	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.14**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0036	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1988	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0819**	**per day**
Average Daily Vapor Temperature Range	ΔTv	46.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1988	psia
Average Daily Liquid Surface Temperature	TLA	542.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**46.69**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**45.28**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	554.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	530.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	554.24	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	531.60	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**12.756**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.199	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.199	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.199	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.199	**-**
ethylbenzene	3.2418	106.17	106	0.25414	0.050516	0.199	**0.25414**
xylenes	9.5142	106.17	106	0.74586	0.148258	0.199	**0.74586**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.199	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.199	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.3531
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.1285
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.1094
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.6467
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2196
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1925
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1072
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0063

Monthly Calculations (continued) **JULY**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**14.89**	lb/month
		7.45E-03	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.23442924	
Partially Insulated	P_{VA}	0.23837791	
Fully Insulated	P_{VA}	0.18904155	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	540.78	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**547.66**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**548.21**	°R
Fully Insulated: TLA = TB	**TLA**	**540.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**553.28**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**555.63**	**°R**
Fully Insulated; Tv = TB	**Tv**	**540.78**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.192E-03	
Partially Insulated	Wv	4.245E-03	
Fully Insulated	Wv	3.459E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**14.72**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0042	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.079	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.17**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0042	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2344	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0792**	**per day**
Average Daily Vapor Temperature Range	ΔTv	45.67	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2344	psia
Average Daily Liquid Surface Temperature	TLA	547.66	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**45.67**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**44.32**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	559.08	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	536.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	559.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	537.13	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**14.891**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.234	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.234	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.234	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.234	-
ethylbenzene	3.7800	106.17	106	0.25385	0.059510	0.234	**0.25385**
xylenes	11.1107	106.17	106	0.74615	0.174920	0.234	**0.74615**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.234	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.234	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.7920
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.4260
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2709
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7488
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2587
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2272
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1278
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0078

Monthly Calculations (continued) **AUGUST**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**12.69**	lb/month
		6.34E-03	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.21928568	
Partially Insulated	P_{VA}	0.22260167	
Fully Insulated	P_{VA}	0.1807964	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	539.38	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**545.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**545.99**	°R
Fully Insulated: TLA = TB	**TLA**	**539.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**550.50**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**552.60**	**°R**
Fully Insulated; Tv = TB	**Tv**	**539.38**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.941E-03	
Partially Insulated	Wv	3.986E-03	
Fully Insulated	Wv	3.316E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.53**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0039	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.072	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.16**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0039	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2193	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0717**	**per day**
Average Daily Vapor Temperature Range	ΔTv	41.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2193	psia
Average Daily Liquid Surface Temperature	TLA	545.51	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**41.39**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**40.08**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	555.85	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	535.16	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	556.01	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	535.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**12.688**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.219	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.219	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.219	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.219	-
ethylbenzene	3.2224	106.17	106	0.25397	0.055691	0.219	**0.25397**
xylenes	9.4657	106.17	106	0.74603	0.163594	0.219	**0.74603**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.219	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.219	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.6078
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.3009
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2029
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7057
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2421
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2125
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1190
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0072

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**8.13**	lb/month
		4.06E-03	ton/month
Time Period		**September**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	psia ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.16589514	
Partially Insulated	P_{VA}	0.16798131	
Fully Insulated	P_{VA}	0.14133053	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.81	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.10**	°R
Fully Insulated: TLA = TB	**TLA**	**531.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**540.70**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**542.38**	**°R**
Fully Insulated; Tv = TB	**Tv**	**531.81**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.036E-03	
Partially Insulated	Wv	3.064E-03	
Fully Insulated	Wv	2.629E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**8.00**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0030	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0030	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1659	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0615**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.21	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1659	psia
Average Daily Liquid Surface Temperature	TLA	536.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.21**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.86**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	545.51	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	527.91	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	545.56	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	528.63	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**8.126**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.166	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.166	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.166	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.166	-
ethylbenzene	2.0677	106.17	106	0.25445	0.042212	0.166	**0.25445**
xylenes	6.0584	106.17	106	0.74555	0.123683	0.166	**0.74555**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.166	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.166	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9306
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8444
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9559
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5508
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1835
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1606
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0884
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050

Monthly Calculations (continued) **OCTOBER**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.47**	lb/month
		2.24E-03	ton/month
Time Period		**October**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	psia ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10505517	
Partially Insulated	P_{VA}	0.10608209	
Fully Insulated	P_{VA}	0.09276994	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	519.47	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**523.04**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**523.32**	°R
Fully Insulated: TLA = TB	**TLA**	**519.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.96**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.18**	**°R**
Fully Insulated; Tv = TB	**Tv**	**519.47**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.976E-03	
Partially Insulated	Wv	1.991E-03	
Fully Insulated	Wv	1.767E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**4.39**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0020	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.08**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0020	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1051	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0502**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1051	psia
Average Daily Liquid Surface Temperature	TLA	523.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.39**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**27.02**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.14	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.08	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.57	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	**lb/month**						
Product	Additive						
Total HAP Emissions =	**4.473**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.105	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.105	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.105	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.105	-
ethylbenzene	1.1414	106.17	106	0.25519	0.026809	0.105	**0.25519**
xylenes	3.3313	106.17	106	0.74481	0.078246	0.105	**0.74481**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.105	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.105	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0866
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2848
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6565
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3673
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1166
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1016
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0543
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) **NOVEMBER**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.14**	lb/month
		1.07E-03	ton/month
Time Period		**November**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06899084	
Partially Insulated	P_{VA}	0.06945466	
Fully Insulated	P_{VA}	0.06334366	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**511.21**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**511.39**	°R
Fully Insulated: TLA = TB	**TLA**	**508.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**513.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**513.89**	**°R**
Fully Insulated; Tv = TB	**Tv**	**508.88**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.330E-03	
Partially Insulated	Wv	1.337E-03	
Fully Insulated	Wv	1.232E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.09**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0013	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.037	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.05**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0013	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0690	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0366**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0690	psia
Average Daily Liquid Surface Temperature	TLA	511.21	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**19.60**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	516.41	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	516.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	506.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**2.144**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAI}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.069	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.069	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.069	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.069	-
ethylbenzene	0.5486	106.17	106	0.25582	0.017649	0.069	**0.25582**
xylenes	1.5957	106.17	106	0.74418	0.051341	0.069	**0.74418**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.069	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.069	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.5276
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9215
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4648
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2532
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0767
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0667
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0346
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0016

Monthly Calculations (continued) **DECEMBER**

Tank No.	20		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.34**	lb/month
		6.72E-04	ton/month
Time Period		**December**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**16.76**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**300**	gal/month
Turnovers	N	**0.17**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**15.76**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**8.38**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04683855	
Partially Insulated	P_{VA}	0.04710842	
Fully Insulated	P_{VA}	0.04353467	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.99	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**500.88**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**501.03**	°R
Fully Insulated: TLA = TB	**TLA**	**499.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.43**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.07**	**°R**
Fully Insulated; Tv = TB	**Tv**	**498.99**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.223E-04	
Partially Insulated	Wv	9.265E-04	
Fully Insulated	Wv	8.632E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.31**	lb/month
Vapor Space Volume	Vv	1429.8	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.04**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	40	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0468	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0320**	**per day**
Average Daily Vapor Temperature Range	ΔTv	18.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0468	psia
Average Daily Liquid Surface Temperature	TLA	500.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.91**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.37	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.26	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	496.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**1,429.77**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	16.76	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	8.38	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**1.344**	**Vapor Weight Concentrations**			**Vapor Mole Fraction**		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAI}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.047	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.047	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.047	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.047	-
ethylbenzene	0.3446	106.17	106	0.25636	0.012008	0.047	**0.25636**
xylenes	0.9997	106.17	106	0.74364	0.034831	0.047	**0.74364**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.047	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.047	**0.00E+00**

	Liquid Mole Fraction				**Component Vapor Pressure**			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1470
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6789
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3384
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1798
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0522
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0452
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0228
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010

HT TANK EMISSION CALCULATION

Tank No.	18		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.83**	lb/year
		0.00	ton/year
Time Period		**Annual**	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1231.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B	B	**0.0**	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	**3.93**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**4.49**	ft
Throughput	Q	**6,000**	gal/yr
Turnovers	N	**12.90**	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10175748	
Partially Insulated	P_{VA}	0.10302818	
Fully Insulated	P_{VA}	0.08679324	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**514.00**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**522.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**522.48**	°R
Fully Insulated: TLA = TB	**TLA**	**517.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.82**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.37**	**°R**
Fully Insulated; Tv = TB	**Tv**	**517.58**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.915E-03	
Partially Insulated	Wv	1.933E-03	
Fully Insulated	Wv	1.659E-03	

Horizontal Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.29**	lb/yr
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0019	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.060	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.54**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	802	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0019	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1018	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0596**	**per day**
Average Daily Vapor Temperature Range	ΔTv	33.26	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1018	psia
Average Daily Liquid Surface Temperature	TLA	522.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**33.26**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**31.92**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.44	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	513.80	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.46	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	514.50	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/yr						
Product	Additive						
Total HAP Emissions =	2.830	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/yr)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VA}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.102	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.102	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.102	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.102	-
ethylbenzene	0.7224	106.17	106	0.25524	0.025973	0.102	**0.25524**
xylenes	2.1078	106.17	106	0.74476	0.075785	0.102	**0.74476**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.102	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.102	**0.00E+00**

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0378
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.2528
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6396
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3571
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1129
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0984
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0524
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0027

Monthly Calculations - JANUARY

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.08	lb/month
		4.01E-05	ton/month
	Time Period	January	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	588.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	3.93	ft
Diameter	D	4.49	ft
Throughput	Q	500	gal/month
Turnovers	N	12.66	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	2.93	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.96	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.97	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03984635	
Partially Insulated	P_{VA}	0.04011524	
Fully Insulated	P_{VA}	0.03657378	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	492.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.56	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	496.73	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	496.90	°R
Fully Insulated: TLA = TB	TLA	494.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	498.50	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	499.24	°R
Fully Insulated; Tv = TB	Tv	494.56	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.908E-04	
Partially Insulated	Wv	7.950E-04	
Fully Insulated	Wv	7.317E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.03	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.036	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.05	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0398	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0359	per day
Average Daily Vapor Temperature Range	ΔTv	19.88	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0398	psia
Average Daily Liquid Surface Temperature	TLA	496.73	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	19.88	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	18.67	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.76	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	501.57	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.23	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	31.09	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	0.080	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{TI} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{TI} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.040	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.040	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.040	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.040	-
ethylbenzene	0.0206	106.17	106	0.25657	0.010224	0.040	0.25657
xylenes	0.0596	106.17	106	0.74343	0.029623	0.040	0.74343
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.040	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.040	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0179
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5977
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2964
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1559
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0445
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0385
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0192
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) **FEBRUARY**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.10	lb/month
		4.80E-05	ton/month
	Time Period	February	
Nearest US Location	New York-Kennedy, NY		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	861.0	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	3.93	ft
Diameter	D	4.49	ft
Throughput	Q	500	gal/month
Turnovers	N	14.01	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	2.93	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.96	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.97	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04514441	
Partially Insulated	P_{VA}	0.04558384	
Fully Insulated	P_{VA}	0.03988878	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	494.25	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.76	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	499.93	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	500.18	°R
Fully Insulated: TLA = TB	TLA	496.8	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.52	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	503.60	°R
Fully Insulated; Tv = TB	Tv	496.76	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.888E-04	
Partially Insulated	Wv	8.955E-04	
Fully Insulated	Wv	7.945E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.04	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.06	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0451	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0474	per day
Average Daily Vapor Temperature Range	ΔTv	25.73	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0451	psia
Average Daily Liquid Surface Temperature	TLA	499.93	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	25.73	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	24.44	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.36	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	493.50	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	506.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	494.07	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	31.09	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	0.096	Vapor Weight Concentrations			Vapor Mole Fraction		
Eq. 40-2 $L_{TI} = Z_{Vi}(L_T)$		Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Individual HAPS	L_{TI} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VA}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.045	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.045	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.045	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.045	-
ethylbenzene	0.0246	106.17	106	0.25641	0.011575	0.045	0.25641
xylenes	0.0714	106.17	106	0.74359	0.033569	0.045	0.74359
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.045	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.045	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1162
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6595
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3283
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1741
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0503
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0436
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0220
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

Monthly Calculations (continued) **MARCH**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.15**	lb/month
		7.58E-05	ton/month
Time Period		**March**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**12.66**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06326638	
Partially Insulated	P_{VA}	0.06407103	
Fully Insulated	P_{VA}	0.05380656	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	504.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**509.19**	°R
Fully Insulated: TLA = TB	**TLA**	**504.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**512.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**513.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**504.52**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.222E-03	
Partially Insulated	Wv	1.234E-03	
Fully Insulated	Wv	1.055E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.07**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.059	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.08**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0633	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0594**	**per day**
Average Daily Vapor Temperature Range	ΔTv	32.32	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0633	psia
Average Daily Liquid Surface Temperature	TLA	508.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.32**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**30.96**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	516.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	500.77	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	516.93	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	501.45	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.152**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV **M_i**	**M_V**	**Z_{Vi}**	**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA **$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.063	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.063	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.063	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.063	**-**
ethylbenzene	0.0388	106.17	106	0.25595	0.016193	0.063	**0.25595**
xylenes	0.1128	106.17	106	0.74405	0.047074	0.063	**0.74405**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.063	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.063	**0.00E+00**

Individual HAPS	**Liquid Mole Fraction** Eq. 40-4 xi = (ZLiML)/Mi **Z_{Li}**	**M_L**	**M_i**	**X_i**	**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C))) **A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4327
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8606
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4330
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2345
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0704
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0611
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0315
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) **APRIL**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.25**	lb/month
		1.23E-04	ton/month
Time Period		**April**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**13.08**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.09753012	
Partially Insulated	P_{VA}	0.09904076	
Fully Insulated	P_{VA}	0.08004645	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	515.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.90**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**521.34**	°R
Fully Insulated: TLA = TB	**TLA**	**515.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.37**	**°R**
Fully Insulated; Tv = TB	**Tv**	**515.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.836E-03	
Partially Insulated	Wv	1.858E-03	
Fully Insulated	Wv	1.537E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.12**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0018	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.072	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0018	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0975	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0720**	**per day**
Average Daily Vapor Temperature Range	ΔTv	39.63	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0975	psia
Average Daily Liquid Surface Temperature	TLA	520.90	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**39.63**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**38.17**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.81	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	510.99	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.88	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	511.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.246**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV **M_i**	**M_V**	**Z_{Vi}**	**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA **$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.098	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.098	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.098	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.098	**-**
ethylbenzene	0.0628	106.17	106	0.25531	0.024900	0.098	**0.25531**
xylenes	0.1832	106.17	106	0.74469	0.072630	0.098	**0.74469**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.098	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.098	**0.00E+00**

Individual HAPS	**Liquid Mole Fraction** Eq. 40-4 xi = (ZLiML)/Mi **Z_{Li}**	**M_L**	**M_i**	**X_i**	**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C))) **A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.9746
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2114
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6176
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3439
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1083
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0943
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0501
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0025

Monthly Calculations (continued) MAY

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.37**	lb/month
		1.86E-04	ton/month
Time Period		**May**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**12.66**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.14083743	
Partially Insulated	P_{VA}	0.14324467	
Fully Insulated	P_{VA}	0.11322224	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	525.22	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**531.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**532.22**	°R
Fully Insulated: TLA = TB	**TLA**	**525.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**537.00**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.22**	**°R**
Fully Insulated; Tv = TB	**Tv**	**525.22**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.595E-03	
Partially Insulated	Wv	2.628E-03	
Fully Insulated	Wv	2.133E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.20**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0026	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.080	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.17**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0026	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1408	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0796**	**per day**
Average Daily Vapor Temperature Range	ΔTv	44.50	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1408	psia
Average Daily Liquid Surface Temperature	TLA	531.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**44.50**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**43.02**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	542.83	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.58	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	542.98	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	521.47	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.372**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.141	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.141	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.141	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.141	**-**
ethylbenzene	0.0949	106.17	106	0.25472	0.035874	0.141	**0.25472**
xylenes	0.2775	106.17	106	0.74528	0.104963	0.141	**0.74528**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.141	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.141	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.5945
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.6201
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8354
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4763
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1560
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1363
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0742
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0040

Monthly Calculations (continued) JUNE

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.51**	lb/month
		2.57E-04	ton/month
Time Period		**June**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**13.08**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.198774	
Partially Insulated	P_{VA}	0.20226181	
Fully Insulated	P_{VA}	0.15885147	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.37	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**542.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**542.92**	°R
Fully Insulated: TLA = TB	**TLA**	**535.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**548.08**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**550.47**	**°R**
Fully Insulated; Tv = TB	**Tv**	**535.37**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.588E-03	
Partially Insulated	Wv	3.635E-03	
Fully Insulated	Wv	2.936E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.27**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0036	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.082	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.24**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0036	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1988	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0819**	**per day**
Average Daily Vapor Temperature Range	ΔTv	46.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1988	psia
Average Daily Liquid Surface Temperature	TLA	542.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**46.69**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**45.28**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	554.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	530.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	554.24	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	531.60	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.514**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.199	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.199	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.199	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.199	**-**
ethylbenzene	0.1306	106.17	106	0.25414	0.050516	0.199	**0.25414**
xylenes	0.3834	106.17	106	0.74586	0.148258	0.199	**0.74586**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.199	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.199	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.3531
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.1285
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.1094
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.6467
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2196
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1925
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1072
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0063

Monthly Calculations (continued) — JULY

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.60**	lb/month
		3.00E-04	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**12.66**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.23442924	
Partially Insulated	P_{VA}	0.23837791	
Fully Insulated	P_{VA}	0.18904155	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	540.78	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**547.66**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**548.21**	°R
Fully Insulated: TLA = TB	**TLA**	**540.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**553.28**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**555.63**	**°R**
Fully Insulated; Tv = TB	**Tv**	**540.78**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.192E-03	
Partially Insulated	Wv	4.245E-03	
Fully Insulated	Wv	3.459E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.32**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0042	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.079	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.28**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0042	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2344	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0792**	**per day**
Average Daily Vapor Temperature Range	ΔTv	45.67	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2344	psia
Average Daily Liquid Surface Temperature	TLA	547.66	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**45.67**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**44.32**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	559.08	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	536.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	559.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	537.13	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**0.600**	**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.234	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.234	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.234	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.234	-
ethylbenzene	0.1524	106.17	106	0.25385	0.059510	0.234	**0.25385**
xylenes	0.4479	106.17	106	0.74615	0.174920	0.234	**0.74615**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.234	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.234	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.7920
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.4260
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2709
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7488
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2587
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2272
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1278
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0078

Monthly Calculations (continued) — AUGUST

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.54**	lb/month
		2.68E-04	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**12.66**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.21928568	
Partially Insulated	P_{VA}	0.22260167	
Fully Insulated	P_{VA}	0.1807964	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	539.38	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**545.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**545.99**	°R
Fully Insulated: TLA = TB	**TLA**	**539.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**550.50**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**552.60**	**°R**
Fully Insulated; Tv = TB	**Tv**	**539.38**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.941E-03	
Partially Insulated	Wv	3.986E-03	
Fully Insulated	Wv	3.316E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.27**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0039	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.072	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.26**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0039	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2193	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0717**	**per day**
Average Daily Vapor Temperature Range	ΔTv	41.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2193	psia
Average Daily Liquid Surface Temperature	TLA	545.51	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**41.39**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**40.08**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	555.85	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	535.16	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	556.01	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	535.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/month						
Product	Additive						
Total HAP Emissions =	**0.536**	**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.219	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.219	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.219	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.219	-
ethylbenzene	0.1361	106.17	106	0.25397	0.055691	0.219	**0.25397**
xylenes	0.3998	106.17	106	0.74603	0.163594	0.219	**0.74603**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.219	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.219	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.6078
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.3009
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2029
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7057
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2421
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2125
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1190
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0072

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.38	lb/month
		1.88E-04	ton/month
Time Period		September	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1328.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	3.93	ft
Diameter	D	4.49	ft
Throughput	Q	500	gal/month
Turnovers	N	13.08	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	2.93	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.96	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.97	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.16589514	
Partially Insulated	P_{VA}	0.16798131	
Fully Insulated	P_{VA}	0.14133053	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	527.95	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.81	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	536.71	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	537.10	°R
Fully Insulated: TLA = TB	TLA	531.8	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	540.70	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	542.38	°R
Fully Insulated; Tv = TB	Tv	531.81	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.036E-03	
Partially Insulated	Wv	3.064E-03	
Fully Insulated	Wv	2.629E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.17	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0030	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.20	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0030	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1659	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0615	per day
Average Daily Vapor Temperature Range	ΔTv	35.21	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1659	psia
Average Daily Liquid Surface Temperature	TLA	536.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.21	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.86	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	545.51	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	527.91	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	545.56	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	528.63	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	31.09	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	0.377	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.166	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.166	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.166	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.166	-
ethylbenzene	0.0959	106.17	106	0.25445	0.042212	0.166	0.25445
xylenes	0.2810	106.17	106	0.74555	0.123683	0.166	0.74555
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.166	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.166	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9306
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8444
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9559
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5508
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1835
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1606
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0884
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050

Monthly Calculations (continued) **OCTOBER**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.23	lb/month
		1.14E-04	ton/month
Time Period		October	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	969.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	0.0	°R
Tank design data			
Shell height	Hs	3.93	ft
Diameter	D	4.49	ft
Throughput	Q	500	gal/month
Turnovers	N	12.66	per year
Roof Type:		0.00	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	2.93	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.96	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.97	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10505517	
Partially Insulated	P_{VA}	0.10608209	
Fully Insulated	P_{VA}	0.09276994	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	516.65	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	519.47	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	523.04	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	523.32	°R
Fully Insulated: TLA = TB	TLA	519.5	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	525.96	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	527.18	°R
Fully Insulated; Tv = TB	Tv	519.47	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.976E-03	
Partially Insulated	Wv	1.991E-03	
Fully Insulated	Wv	1.767E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.10	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0020	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.13	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0020	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1051	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0502	per day
Average Daily Vapor Temperature Range	ΔTv	28.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1051	psia
Average Daily Liquid Surface Temperature	TLA	523.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	28.39	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	27.02	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.14	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.08	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	516.57	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	31.09	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	0.228	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.105	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.105	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.105	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.105	-
ethylbenzene	0.0581	106.17	106	0.25519	0.026809	0.105	0.25519
xylenes	0.1695	106.17	106	0.74481	0.078246	0.105	0.74481
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.105	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.105	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0866
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2848
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6565
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3673
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1166
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1016
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0543
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) **NOVEMBER**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.13**	lb/month
		6.72E-05	ton/month
Time Period		**November**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**13.08**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06899084	
Partially Insulated	P_{VA}	0.06945466	
Fully Insulated	P_{VA}	0.06334366	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**511.21**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**511.39**	°R
Fully Insulated: TLA = TB	**TLA**	**508.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**513.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**513.89**	**°R**
Fully Insulated; Tv = TB	**Tv**	**508.88**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.330E-03	
Partially Insulated	Wv	1.337E-03	
Fully Insulated	Wv	1.232E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.05**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0013	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.037	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.09**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0013	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0690	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0366**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0690	psia
Average Daily Liquid Surface Temperature	TLA	511.21	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**19.60**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	516.41	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	516.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	506.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.134**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.069	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.069	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.069	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.069	-
ethylbenzene	0.0344	106.17	106	0.25582	0.017649	0.069	**0.25582**
xylenes	0.1000	106.17	106	0.74418	0.051341	0.069	**0.74418**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.069	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.069	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.5276
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9215
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4648
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2532
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0767
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0667
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0346
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0016

Monthly Calculations (continued) **DECEMBER**

Tank No.	18		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.09**	lb/month
		4.50E-05	ton/month
Time Period		**December**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**3.93**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**500**	gal/month
Turnovers	N	**12.66**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.96**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04683855	
Partially Insulated	P_{VA}	0.04710842	
Fully Insulated	P_{VA}	0.04353467	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.99	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**500.88**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**501.03**	°R
Fully Insulated: TLA = TB	**TLA**	**499.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.43**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.07**	**°R**
Fully Insulated; Tv = TB	**Tv**	**498.99**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.223E-04	
Partially Insulated	Wv	9.265E-04	
Fully Insulated	Wv	8.632E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Vapor Space Volume	Vv	31.1	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.06**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	67	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0468	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0320**	**per day**
Average Daily Vapor Temperature Range	ΔTv	18.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0468	psia
Average Daily Liquid Surface Temperature	TLA	500.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.91**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.37	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.26	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	496.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**31.09**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	3.93	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**0.090**

Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.047	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.047	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.047	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.047	-
ethylbenzene	0.0231	106.17	106	0.25636	0.012008	0.047	**0.25636**
xylenes	0.0670	106.17	106	0.74364	0.034831	0.047	**0.74364**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.047	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.047	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1470
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6789
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3384
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1798
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0522
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0452
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0228
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010

HT TANK EMISSION CALCULATION

Tank No.	19		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	56.62	lb/year
		0.03	ton/year
Time Period		Annual	
Nearest US Location		New York-Kennedy, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1231.0	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Gasoline Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	7.24	lb/gal
Average Reid Vapor Pressure	RVP	0.00	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	0.00	
Vapor Pressure Equation Constant B	B	0.0	°R
Tank design data			
Effective Height H_E = (Pi)D/4	H_E	11.00	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	13.35	ft
Throughput	Q	96,000	gal/yr
Turnovers	N	8.34	per year
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	11.00	ft
Minimum Filling Height (use 0 if unknown)	HLN	0.00	ft
Liquid height (assume 1/2 H_E)	HL	5.50	ft
Tank Insulation (pick from drop down list)		Not Insulated	
Tank Construction (pick from drop down list)		Welded	
Tank Shell Color (pick from drop down list)		Black	
Tank Shell Condition (pick from drop down list)		Average	
Tank Interior Condition (pick from drop down list)		Light Rust	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	0.97	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	0.03	psi
	PBV	-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10175748	
Partially Insulated	P_{VA}	0.10302818	
Fully Insulated	P_{VA}	0.08679324	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	514.00	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	520.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	517.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	522.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	522.48	°R
Fully Insulated: TLA = TB	TLA	517.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	525.82	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	527.37	°R
Fully Insulated; Tv = TB	Tv	517.58	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.915E-03	
Partially Insulated	Wv	1.933E-03	
Fully Insulated	Wv	1.659E-03	

Horizontal Fixed Roof Tank		Date	11/15/21
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	32.05	lb/yr
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0019	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.060	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	24.57	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	12,832	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0019	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1018	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0596	per day
Average Daily Vapor Temperature Range	ΔTv	33.26	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1018	psia
Average Daily Liquid Surface Temperature	TLA	522.12	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	33.26	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	31.92	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.44	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	513.80	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.46	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	514.50	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	769.69	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	56.621	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$							
Individual HAPS	L_{Ti} (lb/yr)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0000	86.18	106	0.00000	0.000000	0.102	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.102	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.102	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.102	-
ethylbenzene	14.4521	106.17	106	0.25524	0.025973	0.102	0.25524
xylenes	42.1693	106.17	106	0.74476	0.075785	0.102	0.74476
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.102	0.00E+00
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.102	0.00E+00

	Liquid Mole Fraction				Component Vapor Pressure			
	Eq. 40-4 xi = (ZLiML)/Mi				PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
hexane	0.0000000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0378
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	1.2528
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6396
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3571
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1129
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0984
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0524
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0027

Monthly Calculations - JANUARY

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.52**	lb/month
		7.62E-04	ton/month
Time Period		**January**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**588.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
	PBV	**-0.03**	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.03984635	
Partially Insulated	P_{VA}	0.04011524	
Fully Insulated	P_{VA}	0.03657378	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**492.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	498.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	494.56	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**496.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**496.90**	°R
Fully Insulated: TLA = TB	**TLA**	**494.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**498.50**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**499.24**	**°R**
Fully Insulated; Tv = TB	**Tv**	**494.56**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.908E-04	
Partially Insulated	Wv	7.950E-04	
Fully Insulated	Wv	7.317E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.68**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0008	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.036	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.85**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0008	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0398	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0359**	**per day**
Average Daily Vapor Temperature Range	ΔTv	19.88	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0398	psia
Average Daily Liquid Surface Temperature	TLA	496.73	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**19.88**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.67**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	501.70	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	491.76	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	501.57	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	492.23	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	**1.523**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.040	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.040	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.040	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.040	-
ethylbenzene	0.3909	106.17	106	0.25657	0.010224	0.040	**0.25657**
xylenes	1.1326	106.17	106	0.74343	0.029623	0.040	**0.74343**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.040	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.040	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0179
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.5977
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2964
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1559
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0445
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0385
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0192
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0008

Monthly Calculations (continued) **FEBRUARY**

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.86**	lb/month
		9.29E-04	ton/month
Time Period		**February**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**861.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**9.06**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04514441	
Partially Insulated	P_{VA}	0.04558384	
Fully Insulated	P_{VA}	0.03988878	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	500.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	487.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.76	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.93**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**500.18**	°R
Fully Insulated: TLA = TB	**TLA**	**496.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.52**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.60**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.76**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.888E-04	
Partially Insulated	Wv	8.955E-04	
Fully Insulated	Wv	7.945E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.91**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant; Number of Daily Events in a Year	365	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.95**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0451	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0474**	**per day**
Average Daily Vapor Temperature Range	ΔTv	25.73	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0451	psia
Average Daily Liquid Surface Temperature	TLA	499.93	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**25.73**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.44**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.36	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	493.50	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	506.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	494.07	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	Additive						
Total HAP Emissions =	**1.858**	Eq. 40-6 ZVi = yiMi / MV			Eq. 40-5 yi = Pi / PVA		
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)							
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.045	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.045	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.045	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.045	-
ethylbenzene	0.4764	106.17	106	0.25641	0.011575	0.045	**0.25641**
xylenes	1.3815	106.17	106	0.74359	0.033569	0.045	**0.74359**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.045	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.045	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1162
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6595
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3283
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1741
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0503
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0436
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0220
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009

Monthly Calculations (continued) MARCH

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.04**	lb/month
		1.52E-03	ton/month
Time Period		**March**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1175.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06326638	
Partially Insulated	P_{VA}	0.06407103	
Fully Insulated	P_{VA}	0.05380656	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**501.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	494.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	504.52	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**508.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**509.19**	°R
Fully Insulated: TLA = TB	**TLA**	**504.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**512.38**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**513.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**504.52**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.222E-03	
Partially Insulated	Wv	1.234E-03	
Fully Insulated	Wv	1.055E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.73**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0012	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.059	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.31**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0012	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0633	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0594**	**per day**
Average Daily Vapor Temperature Range	ΔTv	32.32	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0633	psia
Average Daily Liquid Surface Temperature	TLA	508.85	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.32**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**30.96**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	516.93	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	500.77	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	516.93	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	501.45	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**3.038**

Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.063	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.063	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.063	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.063	-
ethylbenzene	0.7775	106.17	106	0.25595	0.016193	0.063	**0.25595**
xylenes	2.2603	106.17	106	0.74405	0.047074	0.063	**0.74405**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.063	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.063	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.4327
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.8606
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4330
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2345
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0704
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0611
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0315
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0014

Monthly Calculations (continued) APRIL

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.02**	lb/month
		2.51E-03	ton/month
Time Period		**April**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1516.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.09753012	
Partially Insulated	P_{VA}	0.09904076	
Fully Insulated	P_{VA}	0.08004645	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**510.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	518.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	503.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	515.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**520.90**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**521.34**	°R
Fully Insulated: TLA = TB	**TLA**	**515.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.46**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.37**	**°R**
Fully Insulated; Tv = TB	**Tv**	**515.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.836E-03	
Partially Insulated	Wv	1.858E-03	
Fully Insulated	Wv	1.537E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.05**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0018	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.072	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.96**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0018	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0975	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0720**	**per day**
Average Daily Vapor Temperature Range	ΔTv	39.63	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0975	psia
Average Daily Liquid Surface Temperature	TLA	520.90	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**39.63**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**38.17**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.81	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	510.99	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.88	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	511.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**5.015**

Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)		**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**P_i = P_{VAi}(x_i)**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.098	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.098	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.098	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.098	-
ethylbenzene	1.2804	106.17	106	0.25531	0.024900	0.098	**0.25531**
xylenes	3.7349	106.17	106	0.74469	0.072630	0.098	**0.74469**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.098	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.098	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.9746
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2114
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6176
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3439
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1083
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0943
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0501
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0025

Monthly Calculations (continued) MAY

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**7.70**	lb/month
		3.85E-03	ton/month
Time Period		**May**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1760.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.14083743	
Partially Insulated	P_{VA}	0.14324467	
Fully Insulated	P_{VA}	0.11322224	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**520.10**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	527.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	525.22	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**531.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**532.22**	°R
Fully Insulated: TLA = TB	**TLA**	**525.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**537.00**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.22**	**°R**
Fully Insulated; Tv = TB	**Tv**	**525.22**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.595E-03	
Partially Insulated	Wv	2.628E-03	
Fully Insulated	Wv	2.133E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**4.93**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0026	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.080	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.77**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0026	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1408	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0796**	**per day**
Average Daily Vapor Temperature Range	ΔTv	44.50	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1408	psia
Average Daily Liquid Surface Temperature	TLA	531.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**44.50**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**43.02**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	542.83	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.58	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	542.98	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	521.47	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**7.701**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.141	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.141	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.141	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.141	-
ethylbenzene	1.9617	106.17	106	0.25472	0.035874	0.141	**0.25472**
xylenes	5.7396	106.17	106	0.74528	0.104963	0.141	**0.74528**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.141	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.141	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.5945
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.6201
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.8354
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4763
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1560
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1363
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0742
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0040

Monthly Calculations (continued) JUNE

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**10.63**	lb/month
		5.31E-03	ton/month
Time Period		**June**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1898.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.198774	
Partially Insulated	P_{VA}	0.20226181	
Fully Insulated	P_{VA}	0.15885147	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**529.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	536.90	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	522.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	535.37	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**542.37**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**542.92**	°R
Fully Insulated: TLA = TB	**TLA**	**535.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**548.08**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**550.47**	**°R**
Fully Insulated; Tv = TB	**Tv**	**535.37**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.588E-03	
Partially Insulated	Wv	3.635E-03	
Fully Insulated	Wv	2.936E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**6.79**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0036	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.082	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.84**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0036	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1988	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0819**	**per day**
Average Daily Vapor Temperature Range	ΔTv	46.69	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1988	psia
Average Daily Liquid Surface Temperature	TLA	542.37	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**46.69**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**45.28**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	554.04	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	530.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	554.24	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	531.60	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	lb/month
Product	Additive
Total HAP Emissions =	**10.626**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.199	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.199	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.199	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.199	-
ethylbenzene	2.7006	106.17	106	0.25414	0.050516	0.199	**0.25414**
xylenes	7.9259	106.17	106	0.74586	0.148258	0.199	**0.74586**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.199	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.199	**0.00E+00**

Individual HAPS	Z_{Li}	M_L	M_i	X_i	A	B	C	P_{VAi}
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.3531
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.1285
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.1094
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.6467
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2196
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1925
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1072
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0063

Monthly Calculations (continued) — JULY

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**12.41**	lb/month
		6.20E-03	ton/month
Time Period		**July**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1867.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.23442924	
Partially Insulated	P_{VA}	0.23837791	
Fully Insulated	P_{VA}	0.18904155	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**535.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	542.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	540.78	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**547.66**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**548.21**	°R
Fully Insulated: TLA = TB	**TLA**	**540.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**553.28**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**555.63**	**°R**
Fully Insulated; Tv = TB	**Tv**	**540.78**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.192E-03	
Partially Insulated	Wv	4.245E-03	
Fully Insulated	Wv	3.459E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**7.93**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0042	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.079	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**4.48**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0042	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2344	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0792**	**per day**
Average Daily Vapor Temperature Range	ΔTv	45.67	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2344	psia
Average Daily Liquid Surface Temperature	TLA	547.66	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**45.67**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**44.32**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	559.08	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	536.25	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	559.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	537.13	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**12.408**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.234	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.234	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.234	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.234	-
ethylbenzene	3.1498	106.17	106	0.25385	0.059510	0.234	**0.25385**
xylenes	9.2585	106.17	106	0.74615	0.174920	0.234	**0.74615**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.234	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.234	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.7920
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.4260
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2709
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7488
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2587
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2272
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1278
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0078

Monthly Calculations (continued) — AUGUST

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**10.96**	lb/month
		5.48E-03	ton/month
Time Period		**August**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1661.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type	**Gasoline Additive**		
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.21928568	
Partially Insulated	P_{VA}	0.22260167	
Fully Insulated	P_{VA}	0.1807964	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**534.55**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	528.00	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	539.38	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**545.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**545.99**	°R
Fully Insulated: TLA = TB	**TLA**	**539.4**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**550.50**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**552.60**	**°R**
Fully Insulated; Tv = TB	**Tv**	**539.38**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.941E-03	
Partially Insulated	Wv	3.986E-03	
Fully Insulated	Wv	3.316E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**6.75**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0039	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.072	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**4.21**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0039	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2193	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0717**	**per day**
Average Daily Vapor Temperature Range	ΔTv	41.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.2193	psia
Average Daily Liquid Surface Temperature	TLA	545.51	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**41.39**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**40.08**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	555.85	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	535.16	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	556.01	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	535.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**10.960**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations Eq. 40-6 ZVi = yiMi / MV			Vapor Mole Fraction Eq. 40-5 yi = Pi / PVA		
hexane	0.0000	86.18	106	0.00000	0.000000	0.219	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.219	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.219	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.219	-
ethylbenzene	2.7834	106.17	106	0.25397	0.055691	0.219	**0.25397**
xylenes	8.1762	106.17	106	0.74603	0.163594	0.219	**0.74603**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.219	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.219	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				Component Vapor Pressure PVAi=(0.019337)10^(A-(B/(TLA+C)))			
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.6078
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	2.3009
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.2029
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.7057
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.2421
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.2125
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.1190
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0072

Monthly Calculations (continued) — **SEPTEMBER**

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**7.56**	lb/month
		3.78E-03	ton/month
Time Period		**September**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1328.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.16589514	
Partially Insulated	P_{VA}	0.16798131	
Fully Insulated	P_{VA}	0.14133053	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.95**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	534.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	531.81	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.71**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**537.10**	°R
Fully Insulated: TLA = TB	**TLA**	**531.8**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**540.70**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**542.38**	**°R**
Fully Insulated; Tv = TB	**Tv**	**531.81**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.036E-03	
Partially Insulated	Wv	3.064E-03	
Fully Insulated	Wv	2.629E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**4.31**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0030	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.25**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0030	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1659	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0615**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.21	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1659	psia
Average Daily Liquid Surface Temperature	TLA	536.71	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.21**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.86**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	545.51	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	527.91	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	545.56	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	528.63	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**7.555**

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.166	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.166	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.166	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.166	**-**
ethylbenzene	1.9224	106.17	106	0.25445	0.042212	0.166	**0.25445**
xylenes	5.6326	106.17	106	0.74555	0.123683	0.166	**0.74555**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.166	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.166	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9306
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8444
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9559
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5508
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1835
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1606
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0884
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050

Monthly Calculations (continued) — **OCTOBER**

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.48**	lb/month
		2.24E-03	ton/month
Time Period		**October**	
Nearest US Location	**New York-Kennedy, NY**		
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**969.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.10505517	
Partially Insulated	P_{VA}	0.10608209	
Fully Insulated	P_{VA}	0.09276994	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**516.65**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	523.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	509.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	519.47	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**523.04**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**523.32**	°R
Fully Insulated: TLA = TB	**TLA**	**519.5**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**525.96**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**527.18**	**°R**
Fully Insulated; Tv = TB	**Tv**	**519.47**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.976E-03	
Partially Insulated	Wv	1.991E-03	
Fully Insulated	Wv	1.767E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.37**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0020	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.11**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0020	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1051	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0502**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.1051	psia
Average Daily Liquid Surface Temperature	TLA	523.04	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	13.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.39**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**27.02**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[.	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[/	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	530.14	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	515.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	530.08	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2!	TLN	516.57	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**4.478**

Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$		**Vapor Weight Concentrations** Eq. 40-6 ZVi = yiMi / MV			**Vapor Mole Fraction** Eq. 40-5 yi = Pi / PVA		
Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
hexane	0.0000	86.18	106	0.00000	0.000000	0.105	**-**
benzene	0.0000	78.11	106	0.00000	0.000000	0.105	**-**
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.105	**-**
toluene	0.0000	92.14	106	0.00000	0.000000	0.105	**-**
ethylbenzene	1.1428	106.17	106	0.25519	0.026809	0.105	**0.25519**
xylenes	3.3355	106.17	106	0.74481	0.078246	0.105	**0.74481**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.105	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.105	**0.00E+00**

	Liquid Mole Fraction Eq. 40-4 xi = (ZLiML)/Mi				**Component Vapor Pressure** PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.0866
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.2848
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6565
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3673
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1166
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1016
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0543
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0028

Monthly Calculations (continued) NOVEMBER

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.55**	lb/month
		1.27E-03	ton/month
Time Period		**November**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**630.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.45**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.06899084	
Partially Insulated	P_{VA}	0.06945466	
Fully Insulated	P_{VA}	0.06334366	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	513.20	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.90	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	508.88	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**511.21**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**511.39**	°R
Fully Insulated: TLA = TB	**TLA**	**508.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**513.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**513.89**	**°R**
Fully Insulated: Tv = TB	**Tv**	**508.88**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.330E-03	
Partially Insulated	Wv	1.337E-03	
Fully Insulated	Wv	1.232E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.13**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0013	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.037	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.42**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0013	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0690	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0366**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0690	psia
Average Daily Liquid Surface Temperature	TLA	511.21	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	12.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**19.60**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	516.41	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.00	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	516.29	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.49	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**2.548**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations	Eq. 40-6 ZVi = yiMi / MV		Vapor Mole Fraction	Eq. 40-5 yi = Pi / PVA	
hexane	0.0000	86.18	106	0.00000	0.000000	0.069	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.069	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.069	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.069	-
ethylbenzene	0.6519	106.17	106	0.25582	0.017649	0.069	**0.25582**
xylenes	1.8963	106.17	106	0.74418	0.051341	0.069	**0.74418**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.069	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.069	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction	Eq. 40-4 xi = (ZLiML)/Mi			Component Vapor Pressure	PVAi=(0.019337)10^(A-(B/(TLA+C)))		
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.5276
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9215
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4648
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2532
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0767
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0667
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0346
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0016

Monthly Calculations (continued) DECEMBER

Tank No.	19		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.69**	lb/month
		8.45E-04	ton/month
Time Period		**December**	
Nearest US Location		**New York-Kennedy, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**513.0**	Btu/ft²-day
Absolute Pressure	P_A	14.68	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Gasoline Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**7.24**	lb/gal
Average Reid Vapor Pressure	RVP	**0.00**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**0.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**0.0**	°R
Tank design data			
Shell height	Hs	**11.00**	ft
Diameter	D	**13.35**	ft
Throughput	Q	**8,000**	gal/month
Turnovers	N	**8.18**	per year
Roof Type:		**0.00**	
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**10.00**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**5.50**	ft
Tank Insulation (pick from drop down list)		**Not Insulated**	
Tank Construction (pick from drop down list)		**Welded**	
Tank Shell Color (pick from drop down list)		**Black**	
Tank Shell Condition (pick from drop down list)		**Average**	
Tank Interior Condition (pick from drop down list)		**Light Rust**	
Tank paint solar absorptance, dimensionless, Table 7.1-6	α	**0.97**	
Breather Vent Setting Range (Default Assumption: +/- 0.03)	PBP	**0.03**	psi
		-0.03	
True Vapor Pressure; Eq. 1-25, PvA = exp(A-(B/TLA))			
Not Insulated	P_{VA}	0.04683855	
Partially Insulated	P_{VA}	0.04710842	
Fully Insulated	P_{VA}	0.04353467	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**497.50**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	491.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	498.99	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**500.88**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**501.03**	°R
Fully Insulated: TLA = TB	**TLA**	**499.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.43**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.07**	**°R**
Fully Insulated: Tv = TB	**Tv**	**498.99**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.223E-04	
Partially Insulated	Wv	9.265E-04	
Fully Insulated	Wv	8.632E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.70**	lb/month
Vapor Space Volume	Vv	769.7	ft3
Stock Vapor Density	Wv	0.0009	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.032	per day
Vented Vapor Saturation Factor	Ks	1.00	NA
Constant: Number of Daily Events in a Year	365	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.99**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,069	ft3/month
Working Loss Turnover Factor Eq 1-35 K_N=(180+N)/6N for N>36, else K_N=1	KN	1.0000	
Working Loss Product Factor	Kp	1.00	
Stock Vapor Density	Wv	0.0009	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0468	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0320**	**per day**
Average Daily Vapor Temperature Range	ΔTv	18.07	°R
Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0468	psia
Average Daily Liquid Surface Temperature	TLA	500.88	°R
Atmospheric Pressure	P_A	14.68	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	11.6	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**18.07**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**16.91**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp. (Eq. 1-25 PVX = exp[	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp. (Eq. 1-25 PVN = exp[	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.40	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	496.37	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00000**	**psia**
Vapor pressure at the average daily max liquid surface temp. (Eq. 1-25 usir	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp. (Eq. 1-25 usin	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.26	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	496.80	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**769.69**	ft3
Effective Tank diameter	D_E	13.35	ft
Effective Tank Height	H_E	11.00	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	5.50	ft

HAPS Speciation	**lb/month**
Product	Additive
Total HAP Emissions =	**1.690**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**M_i**	**M_V**	**Z_{Vi}**	**$P_i = P_{VAi}(x_i)$**	**P_{VA}**	**y_i**
		Vapor Weight Concentrations	Eq. 40-6 ZVi = yiMi / MV		Vapor Mole Fraction	Eq. 40-5 yi = Pi / PVA	
hexane	0.0000	86.18	106	0.00000	0.000000	0.047	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.047	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.047	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.047	-
ethylbenzene	0.4333	106.17	106	0.25636	0.012008	0.047	**0.25636**
xylenes	1.2568	106.17	106	0.74364	0.034831	0.047	**0.74364**
cumene	0.0000	120.19	106	0.00000	0.00E+00	0.047	**0.00E+00**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.047	**0.00E+00**

Individual HAPS	**Z_{Li}**	**M_L**	**M_i**	**X_i**	**A**	**B**	**C**	**P_{VAi}**
	Liquid Mole Fraction	Eq. 40-4 xi = (ZLiML)/Mi			Component Vapor Pressure	PVAi=(0.019337)10^(A-(B/(TLA+C)))		
hexane	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1470
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6789
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3384
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1798
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0522
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0452
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0228
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010

PART 212 REVIEW
AIR DISPERSION MODEL PROTOCOL
GLOBAL INWOOD TERMINAL
INWOOD, NY

November 2021

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1.0 Introduction:

Air dispersion modeling will be conducted for the Global Companies LLC (Global) Inwood Terminal (Terminal) located in Inwood, NY. This facility is classified as a gasoline and distillate loading terminal. It consists of five (5) permitted gasoline storage tanks and five (5) distillate tanks. The facility has one (1) truck loading rack. The truck loading rack is controlled by a Vapor Recovery Unit (VRU).

This protocol is being submitted as part of a 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 non-HTACs were included in the modeling if actual emission rates were greater than 100 lb/yr. Air dispersion modeling was conducted to assess whether or not facility benzene emissions and emissions of non-HTACs with actual emissions greater than 100 lb/yr exceed the SGC and AGC levels.

The air dispersion model was completed using the latest version of Lakes AERMOD View Software. Emissions information and results can be found in the following sections, which provide information on variables and modeling assumptions which were used when developing the model.

2.0 Facility Overview and Process Description:

Global's Inwood Terminal is located at 464 Doughty Blvd in Inwood, NY. The facility is permitted for petroleum product loading operations. The permit modification for facility includes a gasoline throughput cap of 603,300,000 gallons in a rolling twelve-month period and a distillate throughput cap of 200,000,000 gallons in a rolling twelve-month period.

3.0 Modeling Methodology:

The projection to be used for the model will be UTM NAD83, zone 18. An aerial image of the site will be 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 will be used. All standard regulatory default options of AERMOD will be invoked.

To facilitate the implementation of AERMOD, the latest version of the Lakes AERMOD View software will be used.

3.2 Site Characterization:

The Inwood Terminal is located at 464 Doughty Blvd in Inwood, NY across the bay from JFK airport. The base elevation for the terminal is approximately 14 ft. Based on a land use analysis of the area surrounding the terminal and the proximity to New York City, the surrounding area will be considered urban in the air dispersion model. A population of 2.8 million will be used in the modeling based on the Nassau County- Suffolk County Metropolitan Division.

3.3 Source Emissions:

3.3.1 Benzene Model

Total benzene emissions from the facility's PTE calculations will be used for modeling. The PTE calculations were performed using AP-42 methodology. Tank emissions (standing and working) will be calculated using the latest AP-42 formulas (AP-42 [7.1 Organic Liquid Storage Tanks]). Tank landing emissions will also be calculated using the latest AP-42 calculation methods (AP-42 [7.1.3.2.2 Roof Landings]).

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 will be controlled with vac assist.

Gasoline and Distillate hazardous air pollutant PTE calculations were performed using the 2020 AP-42 formulas and the liquid weight percent values listed in the 2017 API MPMS Chapter 19.4 Recommended Practice for Speciation of Evaporative Losses. Tables in Attachment 1 summarize the model inputs.

3.3.1.1 Gasoline Storage Tanks:

The facility currently has five (5) gasoline storage tanks. The tanks are equipped with internal floating roofs and have varying capacities. Each tank will be modeled as two volume sources. The upper volume source, which represents 80% of the emissions for the tank, has a release height equal to the tank height. The lower volume source, which represents 20% of the emissions for the tank, has a release height equal to half of the tank height. The initial lateral dimension was calculated by dividing the tank diameter by 4.3. The initial vertical dimension was calculated by dividing the release height by 2.15.

To determine the landing scenario that causes the worst-case short-term (1-hour) impact, landing emissions will be evaluated for each tank separately in the short-term model. The tank with the worst-case estimate of emissions during landing will then be used to determine the maximum hourly emission rate of benzene.

3.3.1.2 Distillate Storage Tanks:

The facility currently has five (5) vertical fixed roof (VFR) distillate storage tanks. Each tank was modeled as a point source with actual tank height as the release height. The gas exit temperature was assumed to be ambient temperature. The stack inside diameter was assumed to be 0.001 m (0.00328 ft). The stack exit velocity was assumed to be 0.001 m/s (0.00328 ft/s).

3.3.1.3 Truck Loading Rack:

The facility has one (1) truck loading rack where gasoline and distillate are loaded. Loading operations will be controlled with a VRU, which will be modeled as a point source. The permitted emissions limit will be 5 mg/L. Manufacturer information will be used to develop source parameters such as stack height, stack diameter, stack temperature, and stack velocity. Loading rack fugitive emissions will be controlled using a vac assist. For the short term dispersion model, the truck loading rack will be assumed to load gasoline at the maximum loading rate as this is the worst case scenario product.

3.3.2 Non-HTAC Model

In accordance with DAR-1, 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
- Xylenes

The calculated hourly ERPs for the non-HTACs listed above are summarized in Attachment 2.

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, and xylene and C for toluene.

Emission rates from each source were calculated using the same methodology as for benzene, with the speciation for each non-HTAC used instead of the speciation for benzene. Modeling was completed using the same assumptions as those in Section 3.3.1 for each source type. The emission rates used in the model are summarized in the tables in Attachment 1.

Table 1 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
xylenes	100	22,000

3.4 Building Downwash Analysis:

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

3.5 Meteorological Data:

Meteorological data which has been pre-processed for AERMOD for the years 2016-2020 will be obtained from the New York State Department of Environmental Conservation. Surface Met Data and Upper Air Met Data is from the Station located at the JFK Airport, which is located approximately 1 mile northwest of the terminal. This station was chosen because of its close proximity to the terminal.

3.6 Modeled Receptors

Boundary receptors will be modeled at the property lines from the facility site plan. Receptors will be located every 25 meters along the facility boundaries. A Cartesian receptor grid will be 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. The terrain processor for AERMOD, AERMAP will be 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 will be input to AERMAP.

4.0 Model Results

The results of this analysis will be clearly summarized in tables that will consist of the following information:

- Predicted concentrations, and
- Comparison to the appropriate standards.

In addition to the tabulated results, maps of concentration isopleths will be presented to further illustrate the results.

Hard copies of the model output files for the controlling year for 1-hour and annual benzene concentrations will be submitted. In addition, a .zip folder will be provided which will contain all pertinent input and output files, as well as the meteorological data files.

Attachment 1
Model Inputs

Inwood Terminal Benzene Annual Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016-2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	119 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.014 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	5.26 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0006 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.25 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	2.85E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.47 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	5.37E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.5 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	5.7E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	1.39 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.59E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	6.84 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	7.81E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	86.7 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0099 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	21.7 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0025 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Benzene Annual Model Assumptions

Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	61.9 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.007 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	15.5 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0018 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft

Inwood Terminal Benzene Annual Model Assumptions

Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	27.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.003 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	6.8 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.00078 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	36.4 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0042 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	9.1 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.001 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	97.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.011 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	24.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0028 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Inwood Terminal Benzene Hourly Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016-2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**			
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.069 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**			
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0092 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	2.85E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	5.37E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	5.7E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.59E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	7.81E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0099 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.02 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0025 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.76 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Benzene Hourly Model Assumptions

Tank 5	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.007 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	2.38 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0018 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.59 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 6	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.003 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.06 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.00078 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.26 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0042 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.28 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.001 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.32 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.011 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.02 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0028 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.76 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Inwood Terminal Toluene Annual Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016-2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	130.9 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.015 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	59.3 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0068 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	2.84 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.2E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	5.48 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	6.2E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	5.8 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	6.6E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	15.8 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0018 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	78.1 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0089 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	111.9 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.013 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	28 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0032 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Toluene Annual Model Assumptions

Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	80.9 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0092 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	20.2 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0023 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft

Inwood Terminal Toluene Annual Model Assumptions

Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	37.2 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0043 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	9.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0011 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	48.6 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0055 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	12.1 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0014 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	129.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.015 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	32.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0037 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Inwood Terminal Toluene Hourly Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016 - 2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**			
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.076 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**			
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.104 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.2E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	6.2E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	6.6E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0018 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0089 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.013 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.56 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0032 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.89 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Toluene Hourly Model Assumptions

Tank 5	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0092 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	2.81 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0023 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.7 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 6	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0043 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.24 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0011 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.31 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0055 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.51 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0014 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.38 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.015 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.56 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0037 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.89 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Inwood Terminal Xylene Annual Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016-2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	35.2 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.004 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	144.4 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.016 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	7.24 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	8.26E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	13.95 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.59E-3 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	14.7 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.68E-3 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	39.84 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	4.55E-3 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	196 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0244 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	45.7 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0052 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	11.4 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0013 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Xylene Annual Model Assumptions

Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	34.1 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0039 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	8.5 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	9.7E-4 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft

Inwood Terminal Xylene Annual Model Assumptions

Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	17.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.002 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	4.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	4.9E-4 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	21.4 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0024 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	5.3 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	6.1E-4 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	55.4 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0063 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	13.8 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0016 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Inwood Terminal Xylene Hourly Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016-2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**			
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.021 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**			
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.254 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	8.26E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.59E-3 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.68E-3 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	4.55E-3 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**			
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0244 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0052 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.06 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate Not During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.0013 lb/hr
(Gasoline)		Emission Rate During Landing	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.26 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Xylene Hourly Model Assumptions

Tank 5 **(Gasoline)** **IFR - Upper Source** **80% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Tank Height. Approx height of roof vents. Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	0.0039 lb/hr 0.83 lb/hr 39 ft 75 ft 18.1 ft 17.4 ft
Tank 5 **(Gasoline)** **IFR - Lower Source** **20% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Half of Tank Height Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	9.7E-4 lb/hr 0.21 lb/hr 19.5 ft 75 ft 9.1 ft 17.4 ft
Tank 6 **(Gasoline)** **IFR - Upper Source** **80% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Tank Height. Approx height of roof vents. Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	0.002 lb/hr 0.37 lb/hr 39 ft 50 ft 18.1 ft 11.6 ft
Tank 6 **(Gasoline)** **IFR - Lower Source** **20% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Half of Tank Height Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	4.9E-4 lb/hr 0.093 lb/hr 19.5 ft 50 ft 9.1 ft 11.6 ft
Tank 7 **(Gasoline)** **IFR - Upper Source** **80% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Tank Height. Approx height of roof vents. Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	0.0024 lb/hr 0.45 lb/hr 39 ft 55 ft 18.1 ft 12.8 ft
Tank 7 **(Gasoline)** **IFR - Lower Source** **20% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Half of Tank Height Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	6.1E-4 lb/hr 0.11 lb/hr 19.5 ft 55 ft 9.1 ft 12.8 ft
Tank 10 **(Gasoline)** **IFR - Upper Source** **80% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Tank Height. Approx height of roof vents. Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	0.0063 lb/hr 1.06 lb/hr 45 ft 125 ft 20.9 ft 29.1 ft
Tank 10 **(Gasoline)** **IFR - Lower Source** **20% of Emission Rate**	**Volume Source**	Emission Rate Not During Landing Emission Rate During Landing Release Height Diameter Initial Vertical Dimension Initial Lateral Dimension	From PTE Calculations for Maximum Potential Annual and Short Term Impact From PTE Calculations for Maximum Potential Annual and Short Term Impact. Half of Tank Height Tank Diameter Tank height divided by 2.15 Tank Diameter divided by 4.3	0.0016 lb/hr 0.26 lb/hr 22.5 ft 125 ft 10.5 ft 29.1 ft

Inwood Terminal Hexane Annual Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016-2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	108.2 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.012 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.1E-4 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.05 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	5.68E-6 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.096 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.1E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.1 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.15E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0.28 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	3.28E-5 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	1.4 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	1.6E-4 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	76 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0087 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	19 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0022 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal Hexane Annual Model Assumptions

Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	54.2 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.006 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	13.6 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0015 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft

Inwood Terminal Hexane Annual Model Assumptions

Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	23.8 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0027 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	5.95 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	6.8E-4 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	31.8 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0036 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	7.9 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	9E-4 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	84.5 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0096 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	21.1 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0024 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Inwood Terminal 2,2,4-TMP Annual Model Assumptions

		Parameter	Assumptions / Notes	Value
General				
		Projection	**UTM**	UTM
		Datum	WGS 84	NAD83
		UTM Zone	18	18
		Hemisphere	Northern	Northern
		AERMET	2016 - 2020 MET Data	2016-2020 Data
		AERMAP	1-deg DEM Data from webgis.com	1 deg DEM Data
Sources				
VRU	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	135.9 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.016 lb/hr
		Stack Height	Actual Stack Height	20 ft
(Gasoline)		Stack Temperature	Release Temperature	Ambient
		Stack Velocity	Assumed	1.35 ft/s
		Stack Diameter	Actual Stack Diameter	3.5 ft
		Emissions Limit		5 mg/l
Truck Rack	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/yr
		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/hr
		Release Height	Center of Plume	10 ft
(Distillate fugitives)		Initial Horizontal Dimension	Length of Side divided by 4.3	21.9 ft
		Initial Vertical Dimension	Center of Plume height divided by 2.15	4.65 ft
Tank 1	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 2	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	34 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 3	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	35 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 8	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 9	**Point Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	0 lb/yr
(Distillate)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
Fixed Roof Tank		Stack Inside Diameter	Assumed	0.00328 ft
		Gas Exit Velocity	Assumed	0.00328 ft/s
		Gas Exit Temperature	Assumed	Ambient
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	104.4 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.012 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	100 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft
Tank 4	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	26.1 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.003 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	100 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	23.3 ft

Inwood Terminal 2,2,4-TMP Annual Model Assumptions

Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	75 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0086 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	75 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft
Tank 5	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	18.7 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.002 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	75 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	17.4 ft

Inwood Terminal 2,2,4-TMP Annual Model Assumptions

Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	33.7 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0038 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	50 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 6	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	8.4 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	9.6E-4 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	50 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	11.6 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	44.5 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.005 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	39 ft
IFR - Upper Source		Diameter	Tank Diameter	55 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	18.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 7	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	11.1 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0013 lb/hr
		Release Height	Half of Tank Height	19.5 ft
IFR - Lower Source		Diameter	Tank Diameter	55 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	9.1 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	12.8 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	118.5 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.014 lb/hr
		Release Height	Tank Height. Approx height of roof vents.	45 ft
IFR - Upper Source		Diameter	Tank Diameter	125 ft
80% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	20.9 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft
Tank 10	**Volume Source**	Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact	29.6 lb/yr
(Gasoline)		Emission Rate	From PTE Calculations for Maximum Potential Annual and Short Term Impact.	0.0034 lb/hr
		Release Height	Half of Tank Height	22.5 ft
IFR - Lower Source		Diameter	Tank Diameter	125 ft
20% of Emission Rate		Initial Vertical Dimension	Tank height divided by 2.15	10.5 ft
		Initial Lateral Dimension	Tank Diameter divided by 4.3	29.1 ft

Attachment 2
ERP Summary

Inwood ERP Summary for Non-HTACs

	hexane	2,2,4-TMP	toluene	xylenes
Actual Emissions 2020 (lb/year)	131.73	180.71	249.16	403.83
Toxicity Rating from DAR-1	M	M	L	M
ERP Tank 4 (lb/hr)[a]	5.169	6.770	6.847	2.008
ERP Tank 5 (lb/hr)[a]	2.908	3.808	3.852	1.129
ERP Tank 6 (lb/hr)[a]	1.292	1.693	1.712	0.502
ERP Tank 7 (lb/hr)[a]	1.564	2.048	2.071	0.607
ERP Tank 10 (lb/hr)[a]	8.077	10.578	10.699	3.138

[a] = Based on refilling the tank after a landing at a filling rate of 2500 bph.

Full Environmental Assessment Form
Part 1 - Project and Setting

Instructions for Completing Part 1

Part 1 is to be completed by the applicant or project sponsor. Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1is accurate and complete.

A. Project and Applicant/Sponsor Information.

Name of Action or Project: Global Inwood Terminal Throughput Modification		
Project Location (describe, and attach a general location map): 464 Doughty Blvd., Inwood, NY 11096		
Brief Description of Proposed Action (include purpose or need): Global Companies LLC is proposing a facility throughput increase of gasoline at the Global Inwood Terminal to meet increased demand. The Vapor Recovery Unit (VRU) limit will be reduced from 10 mg/L to 3 mg/L as part of this modification by installing a new VRU at the facility. The existing VRU will be used as a backup at the current 10 mg/L limit. This reduction will substantially reduce potential emissions on a per gallon loaded basis by reducing the permitted emission rate for gasoline loading from 10 mg/l to 3 mg/l. A vacuum assist will also be installed to eliminate loading fugitive emissions.		
Name of Applicant/Sponsor: Global Companies LLC	Telephone: 781-894-8800 E-Mail: tkeefe@globalp.com	
Address: 800 South Street, Suite 500		
City/PO: Waltham	State: MA	Zip Code: 02454
Project Contact (if not same as sponsor; give name and title/role): Tom Keefe; VP - Environmental, Health and Safety	Telephone: 781-398-4132 E-Mail: tkeefe@globalp.com	
Address: 800 South Street, Suite 500		
City/PO: Waltham	State: MA	Zip Code: 02454
Property Owner (if not same as sponsor):	Telephone: E-Mail:	
Address:		
City/PO:	State:	Zip Code:

B. Government Approvals

B. Government Approvals, Funding, or Sponsorship. ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity		If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Counsel, Town Board, or Village Board of Trustees	☐Yes ☑No		
b. City, Town or Village Planning Board or Commission	☐Yes ☑No		
c. City, Town or Village Zoning Board of Appeals	☐Yes ☑No		
d. Other local agencies	☑Yes ☐No	Town of Hempstead, Building Department	Building Permit may be required; to be discussed with the Town prior to construction.
e. County agencies	☐Yes ☑No		
f. Regional agencies	☐Yes ☑No		
g. State agencies	☑Yes ☐No	NYSDEC - Air Permit Modification	November 2021
h. Federal agencies	☑Yes ☐No	EPA - Review / Comment on Air Permit Modification	

i. Coastal Resources.

i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway? ☑Yes ☐No

ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program? ☐ Yes ☑No

iii. Is the project site within a Coastal Erosion Hazard Area? ☐ Yes ☑No

C. Planning and Zoning

C.1. Planning and zoning actions.

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed? ☐Yes ☑No

- **If Yes,** complete sections C, F and G.
- **If No,** proceed to question C.2 and complete all remaining sections and questions in Part 1

C.2. Adopted land use plans.

a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located? ☐Yes ☑No

If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located? ☐Yes ☐No

b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?) ☐Yes ☑No

If Yes, identify the plan(s):

____

c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan? ☐Yes ☑No

If Yes, identify the plan(s):

____

C.3. Zoning

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance. ☑ Yes ☐ No

If Yes, what is the zoning classification(s) including any applicable overlay district?

Industrial

b. Is the use permitted or allowed by a special or conditional use permit? ☐ Yes ☑ No

c. Is a zoning change requested as part of the proposed action? ☐ Yes ☑ No

If Yes,

i. What is the proposed new zoning for the site? ______

C.4. Existing community services.

a. In what school district is the project site located? Lawrence Union Free School District

b. What police or other public protection forces serve the project site?

Nassau County Police Department

c. Which fire protection and emergency medical services serve the project site?

Inwood Fire Department

d. What parks serve the project site?

Inwood Park (1 mile SW); Cedarhurst Park (0.87 miles east)

D. Project Details

D.1. Proposed and Potential Development

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Industrial

b. a. Total acreage of the site of the proposed action? 11.2 acres

b. Total acreage to be physically disturbed? 0.1 acres

c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 11.2 acres

c. Is the proposed action an expansion of an existing project or use? ☐ Yes ☑ No

i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % ______ Units: ______

d. Is the proposed action a subdivision, or does it include a subdivision? ☐ Yes ☑ No

If Yes,

i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types)

ii. Is a cluster/conservation layout proposed? ☐ Yes ☐ No

iii. Number of lots proposed? ______

iv. Minimum and maximum proposed lot sizes? Minimum ______ Maximum ______

e. Will the proposed action be constructed in multiple phases? ☐ Yes ☑ No

i. If No, anticipated period of construction: ______ months

ii. If Yes:

- Total number of phases anticipated ______
- Anticipated commencement date of phase 1 (including demolition) ______ month ______ year
- Anticipated completion date of final phase ______ month ______ year
- Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases: ______

f. Does the project include new residential uses? ☐Yes ☑No
If Yes, show numbers of units proposed.

	One Family	Two Family	Three Family	Multiple Family (four or more)
Initial Phase	___________	___________	___________	________________________
At completion of all phases	___________	___________	___________	________________________

g. Does the proposed action include new non-residential construction (including expansions)? ☐Yes ☑No
If Yes,
i. Total number of structures ___________
ii. Dimensions (in feet) of largest proposed structure: ________height; ________width; and _______ length
iii. Approximate extent of building space to be heated or cooled: ______________________ square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage? ☐Yes ☑No
If Yes,
i. Purpose of the impoundment: ____
ii. If a water impoundment, the principal source of the water: ☐ Ground water ☐ Surface water streams ☐ Other specify:
____
iii. If other than water, identify the type of impounded/contained liquids and their source.
____
iv. Approximate size of the proposed impoundment. Volume: ____________ million gallons; surface area: ____________ acres
v. Dimensions of the proposed dam or impounding structure: ________ height; _______ length
vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete):
____

D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? ☐Yes ☑No
(Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite)
If Yes:
i .What is the purpose of the excavation or dredging? ____
ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?
- Volume (specify tons or cubic yards): ____
- Over what duration of time? ____

iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them.
____
____
i*v.* Will there be onsite dewatering or processing of excavated materials? ☐Yes ☐No
If yes, describe. ____
____
v. What is the total area to be dredged or excavated? ____________________________________acres
vi. What is the maximum area to be worked at any one time? ______________________________ acres
vii. What would be the maximum depth of excavation or dredging? _________________________ feet
viii. Will the excavation require blasting? ☐Yes ☐No
ix. Summarize site reclamation goals and plan: ____
____
____

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area? ☐Yes ☑No
If Yes:
i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description): ____
____

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres: ____________________

iii. Will the proposed action cause or result in disturbance to bottom sediments? ☐Yes ☐No
If Yes, describe: ____________________

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation? ☐Yes ☐No
If Yes:

- acres of aquatic vegetation proposed to be removed: ____________________
- expected acreage of aquatic vegetation remaining after project completion: ____________________
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access): ____________________
- proposed method of plant removal: ____________________
- if chemical/herbicide treatment will be used, specify product(s): ____________________

v. Describe any proposed reclamation/mitigation following disturbance: ____________________

c. Will the proposed action use, or create a new demand for water? ☐Yes ☑No
If Yes:
i. Total anticipated water usage/demand per day: ____________________ gallons/day
ii. Will the proposed action obtain water from an existing public water supply? ☐Yes ☐No
If Yes:

- Name of district or service area: ____________________
- Does the existing public water supply have capacity to serve the proposal? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No
- Do existing lines serve the project site? ☐Yes ☐No

iii. Will line extension within an existing district be necessary to supply the project? ☐Yes ☐No
If Yes:

- Describe extensions or capacity expansions proposed to serve this project: ____________________
- Source(s) of supply for the district: ____________________

iv. Is a new water supply district or service area proposed to be formed to serve the project site? ☐Yes ☐No
If, Yes:

- Applicant/sponsor for new district: ____________________
- Date application submitted or anticipated: ____________________
- Proposed source(s) of supply for new district: ____________________

v. If a public water supply will not be used, describe plans to provide water supply for the project: ____________________

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: _______ gallons/minute.

d. Will the proposed action generate liquid wastes? ☐Yes ☑No
If Yes:
i. Total anticipated liquid waste generation per day: ____________________ gallons/day
ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each): ____________________

iii. Will the proposed action use any existing public wastewater treatment facilities? ☐Yes ☐No
If Yes:

- Name of wastewater treatment plant to be used: ____________________
- Name of district: ____________________
- Does the existing wastewater treatment plant have capacity to serve the project? ☐Yes ☐No
- Is the project site in the existing district? ☐Yes ☐No
- Is expansion of the district needed? ☐Yes ☐No

- Do existing sewer lines serve the project site? ☐Yes ☐No
- Will a line extension within an existing district be necessary to serve the project? ☐Yes ☐No

  If Yes:
  - Describe extensions or capacity expansions proposed to serve this project: ____________________

iv. Will a new wastewater (sewage) treatment district be formed to serve the project site? ☐Yes ☐No

If Yes:
- Applicant/sponsor for new district: ____________________
- Date application submitted or anticipated: ____________________
- What is the receiving water for the wastewater discharge? ____________________

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans):

____

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: ____________________

e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction? ☐Yes ☑No

If Yes:

i. How much impervious surface will the project create in relation to total size of project parcel?

_____ Square feet or _____ acres (impervious surface)

_____ Square feet or _____ acres (parcel size)

ii. Describe types of new point sources. ____________________

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?

____

- If to surface waters, identify receiving water bodies or wetlands: ____________________
- Will stormwater runoff flow to adjacent properties? ☐Yes ☐No

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater? ☐Yes ☐No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations? ☑Yes ☐No

If Yes, identify:

i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)

Mobile sources include tanker trucks.

ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)

There will be no stationary sources during construction.

iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)

Gasoline/ethanol storage tanks; VRU at truck rack; Fugitive Vacuum Assisted Vapor Reduction System at truck rack. Misc. Equip. Fugitive emissions.

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit? ☑Yes ☐No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year) ☑Yes ☐No

ii. In addition to emissions as calculated in the application, the project will generate:
- See Note Tons/year (short tons) of Carbon Dioxide (CO_2)
- See Note Tons/year (short tons) of Nitrous Oxide (N_2O)
- See Note Tons/year (short tons) of Perfluorocarbons (PFCs)
- See Note Tons/year (short tons) of Sulfur Hexafluoride (SF_6)
- See Note Tons/year (short tons) of Carbon Dioxide equivalent of Hydroflourocarbons (HFCs)
- See Note Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

There are no emissions "in addition to emissions as calculated in the application" therefore this section is intentionally left black.

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)? ☐Yes ☑No

If Yes:

i. Estimate methane generation in tons/year (metric): ______

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): ______

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations? ☐Yes ☑No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

______

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services? ☐Yes ☑No

If Yes:

i. When is the peak traffic expected (Check all that apply): ☐ Morning ☐ Evening ☐Weekend
☐ Randomly between hours of ______ to ______.

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): ______

iii. Parking spaces: Existing ______ Proposed ______ Net increase/decrease ______

iv. Does the proposed action include any shared use parking? ☐Yes ☐No

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe: ______

vi. Are public/private transportation service(s) or facilities available within ½ mile of the proposed site? ☐Yes ☐No

vii Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles? ☐Yes ☐No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes? ☐Yes ☐No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy? ☐Yes ☑No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: ______

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other): ______

iii. Will the proposed action require a new, or an upgrade, to an existing substation? ☐Yes ☐No

l. Hours of operation. Answer all items which apply.

i. During Construction:
- Monday - Friday: 24/7
- Saturday: 24/7
- Sunday: 24/7
- Holidays: 24/7

ii. During Operations:
- Monday - Friday: 24/7
- Saturday: 24/7
- Sunday: 24/7
- Holidays: 24/7

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both? ☐ Yes ☑ No

If yes:

i. Provide details including sources, time of day and duration:

____

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen? ☐ Yes ☑ No

Describe: _______________

n. Will the proposed action have outdoor lighting? ☐ Yes ☑ No

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

____

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen? ☐ Yes ☐ No

Describe: _______________

o. Does the proposed action have the potential to produce odors for more than one hour per day? ☑ Yes ☐ No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures:

Routine odors associated with petroleum terminal operations. No off site odor.

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage? ☑ Yes ☐ No

If Yes:

i. Product(s) to be stored Gasoline

ii. Volume(s) variable per unit time year (e.g., month, year)

iii. Generally, describe the proposed storage facilities:

Storage of gasoline in internal floating roof tanks.

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation? ☐ Yes ☑ No

If Yes:

i. Describe proposed treatment(s):

____

ii. Will the proposed action use Integrated Pest Management Practices? ☐ Yes ☐ No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)? ☐ Yes ☑ No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

- Construction: ____________ tons per ____________ (unit of time)
- Operation : ____________ tons per ____________ (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: _______________
- Operation: _______________

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: _______________
- Operation: _______________

s. Does the proposed action include construction or modification of a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): ____________

ii. Anticipated rate of disposal/processing:

- ________ Tons/month, if transfer or other non-combustion/thermal treatment, or
- ________ Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: ____________ years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: ____________

ii. Generally describe processes or activities involving hazardous wastes or constituents: ____________

iii. Specify amount to be handled or generated _____ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: ____________

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility? ☐ Yes ☐ No

If Yes: provide name and location of facility: ____________

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility:

No hazardous waste disposal is anticipated.

E. Site and Setting of Proposed Action

E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

☐ Urban ☑ Industrial ☑ Commercial ☑ Residential (suburban) ☐ Rural (non-farm)
☐ Forest ☐ Agriculture ☐ Aquatic ☐ Other (specify): ____________

ii. If mix of uses, generally describe:

The Terminal is located on Doughty Boulevard in a heavily mixed use area including industrial, commercial, and residential plots in the Village of Inwood,Town of Hempstead, in Nassau County, NY.

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	11.2	11.2	0
• Forested	0	0	0
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	0	0	0
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	0
• Surface water features (lakes, ponds, streams, rivers, etc.)	0	0	0
• Wetlands (freshwater or tidal)	0	0	0
• Non-vegetated (bare rock, earth or fill)	0	0	0
• Other Describe: N/A	0	0	0

c. Is the project site presently used by members of the community for public recreation? ☐ Yes ☑ No

i. If Yes: explain: ______

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site? ☐ Yes ☑ No

If Yes,

i. Identify Facilities:

______

______

e. Does the project site contain an existing dam? ☐ Yes ☑ No

If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: ______ feet
- Dam length: ______ feet
- Surface area: ______ acres
- Volume impounded: ______ gallons OR acre-feet

ii. Dam's existing hazard classification: ______

iii. Provide date and summarize results of last inspection:

______

______

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility? ☐ Yes ☑ No

If Yes:

i. Has the facility been formally closed? ☐ Yes ☐ No

- If yes, cite sources/documentation: ______

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility:

______

______

iii. Describe any development constraints due to the prior solid waste activities: ______

______

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste? ☐ Yes ☑ No

If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred:

______

______

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site? ☑ Yes ☐ No

If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply: ☐ Yes ☐ No

☑ Yes – Spills Incidents database — Provide DEC ID number(s): 1902557, 1900399, 1800707, 1705941

☐ Yes – Environmental Site Remediation database — Provide DEC ID number(s): ______

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: ______

______

______

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database? ☑ Yes ☐ No

If yes, provide DEC ID number(s): 130091, V00212

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

130091: Remedial Investigations performed since 2007 have shown significant decreases in contaminant levels in groundwater.

V00212: Remedial actions complete at the site have significantly reduced the levels of contaminants. Residual contamination capped by asphalt surface.

v. Is the project site subject to an institutional control limiting property uses? ☑ Yes ☐ No

- If yes, DEC site ID number: various
- Describe the type of institutional control (e.g., deed restriction or easement): Deed Restriction
- Describe any use limitations: Property cannot be used for Residential uses.
- Describe any engineering controls: N/A
- Will the project affect the institutional or engineering controls in place? ☐ Yes ☑ No
- Explain: ______

E.2. Natural Resources On or Near Project Site

a. What is the average depth to bedrock on the project site? >5 feet

b. Are there bedrock outcroppings on the project site? ☐ Yes ☑ No
If Yes, what proportion of the site is comprised of bedrock outcroppings? ______%

c. Predominant soil type(s) present on project site: Fill 100 %
______ ______%
______ ______%

d. What is the average depth to the water table on the project site? Average: 15 feet

e. Drainage status of project site soils: ☐ Well Drained: ______% of site
☑ Moderately Well Drained: 100 % of site
☐ Poorly Drained ______% of site

f. Approximate proportion of proposed action site with slopes: ☑ 0-10%: 100 % of site
☐ 10-15%: ______% of site
☐ 15% or greater: ______% of site

g. Are there any unique geologic features on the project site? ☐ Yes ☑ No
If Yes, describe: ______

h. Surface water features.
i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)? ☑ Yes ☐ No
ii. Do any wetlands or other waterbodies adjoin the project site? ☑ Yes ☐ No
If Yes to either *i* or *ii*, continue. If No, skip to E.2.i.
iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency? ☑ Yes ☐ No
iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

- Streams: Name ______ Classification ______
- Lakes or Ponds: Name ______ Classification ______
- Wetlands: Name Tidal Wetlands, Federal Waters Approximate Size ______
- Wetland No. (if regulated by DEC) ______

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies? ☐ Yes ☑ No
If yes, name of impaired water body/bodies and basis for listing as impaired: ______

i. Is the project site in a designated Floodway? ☐ Yes ☑ No

j. Is the project site in the 100-year Floodplain? ☑ Yes ☐ No

k. Is the project site in the 500-year Floodplain? ☑ Yes ☐ No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer? ☑ Yes ☐ No
If Yes:
i. Name of aquifer: Sole Source Aquifer Names:Nassau-Suffolk SSA

m. Identify the predominant wildlife species that occupy or use the project site:

None

n. Does the project site contain a designated significant natural community? ☑ Yes ☐ No

If Yes:

i. Describe the habitat/community (composition, function, and basis for designation):

Marine Back-barrier Lagoon, Low Salt Marsh

ii. Source(s) of description or evaluation:

iii. Extent of community/habitat:

- Currently: 14136.0, 1237.41 acres
- Following completion of project as proposed: ______ acres
- Gain or loss (indicate + or -): ______ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species? ☐ Yes ☑ No

If Yes:

i. Species and listing (endangered or threatened):

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern? ☐ Yes ☑ No

If Yes:

i. Species and listing:

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing? ☐ Yes ☐ No

If yes, give a brief description of how the proposed action may affect that use:

E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304? ☐ Yes ☑ No

If Yes, provide county plus district name/number:

b. Are agricultural lands consisting of highly productive soils present? ☐ Yes ☑ No

i. If Yes: acreage(s) on project site?

ii. Source(s) of soil rating(s):

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark? ☐ Yes ☑ No

If Yes:

i. Nature of the natural landmark: ☐ Biological Community ☐ Geological Feature

ii. Provide brief description of landmark, including values behind designation and approximate size/extent:

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area? ☑ Yes ☐ No

If Yes:

i. CEA name: Jamaica Bay

ii. Basis for designation: Protect ecosystem & large number of wildlife

iii. Designating agency and date: Agency:Kings, Queens, Nassau County, Date:2-1-90

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places? ☐ Yes ☑ No

If Yes:

i. Nature of historic/archaeological resource: ☐ Archaeological Site ☐ Historic Building or District

ii. Name: ______________________

iii. Brief description of attributes on which listing is based:

____

f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory? ☑ Yes ☐ No

g. Have additional archaeological or historic site(s) or resources been identified on the project site? ☐ Yes ☑ No

If Yes:

i. Describe possible resource(s): ______________________

ii. Basis for identification: ______________________

h. Is the project site within fives miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource? ☑ Yes ☐ No

If Yes:

i. Identify resource: Jamaica Bay National Wildlife Refuge

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): National Wildlife Refuge

iii. Distance between project and resource: approximately 4 miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program 6 NYCRR 666? ☐ Yes ☑ No

If Yes:

i. Identify the name of the river and its designation: ______________________

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666? ☐ Yes ☐ No

F. Additional Information

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

G. Verification

I certify that the information provided is true to the best of my knowledge.

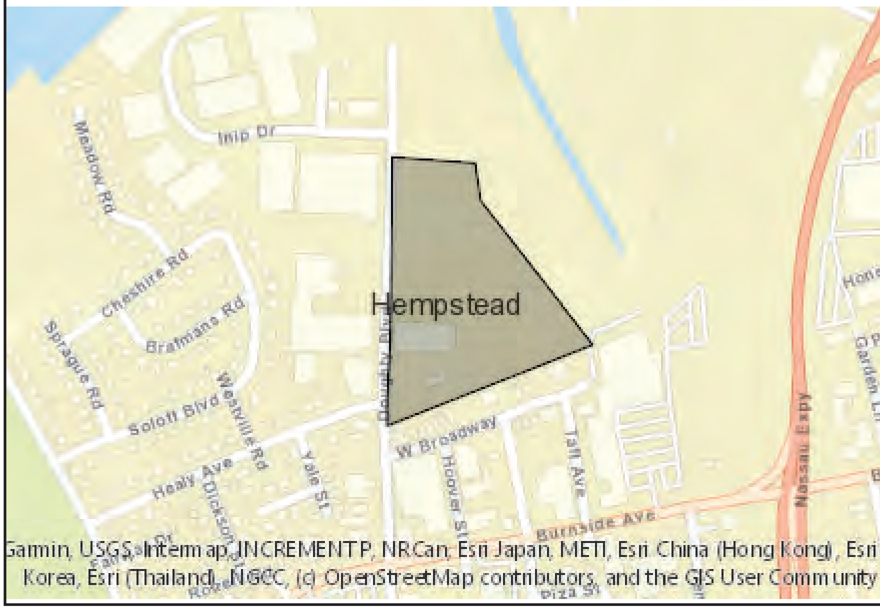
Applicant/Sponsor Name ______________________ Date______________________

Signature______________________ Title______________________

PRINT FORM

EAF Mapper Summary Report

Thursday, October 28, 2021 1:08 PM



Disclaimer: The EAF Mapper is a screening tool intended to assist project sponsors and reviewing agencies in preparing an environmental assessment form (EAF). Not all questions asked in the EAF are answered by the EAF Mapper. Additional information on any EAF question can be obtained by consulting the EAF Workbooks. Although the EAF Mapper provides the most up-to-date digital data available to DEC, you may also need to contact local or other data sources in order to obtain data not provided by the Mapper. Digital data is not a substitute for agency determinations.

B.i.i [Coastal or Waterfront Area]	Yes
B.i.ii [Local Waterfront Revitalization Area]	No
C.2.b. [Special Planning District]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.iii [Within 2,000' of DEC Remediation Site]	Yes
E.1.h.iii [Within 2,000' of DEC Remediation Site - DEC ID]	130091, V00212
E.2.g [Unique Geologic Features]	No
E.2.h.i [Surface Water Features]	Yes
E.2.h.ii [Surface Water Features]	Yes
E.2.h.iii [Surface Water Features]	Yes - Digital mapping information on local and federal wetlands and waterbodies is known to be incomplete. Refer to EAF Workbook.
E.2.h.iv [Surface Water Features - Wetlands Name]	Tidal Wetlands, Federal Waters
E.2.h.v [Impaired Water Bodies]	No
E.2.i. [Floodway]	No
E.2.j. [100 Year Floodplain]	Yes
E.2.k. [500 Year Floodplain]	Yes
E.2.l. [Aquifers]	Yes

E.2.l. [Aquifer Names]	Sole Source Aquifer Names:Nassau-Suffolk SSA
E.2.n. [Natural Communities]	Yes
E.2.n.i [Natural Communities - Name]	Marine Back-barrier Lagoon, Low Salt Marsh
E.2.n.i [Natural Communities - Acres]	14136.0, 1237.41
E.2.o. [Endangered or Threatened Species]	No
E.2.p. [Rare Plants or Animals]	No
E.3.a. [Agricultural District]	No
E.3.c. [National Natural Landmark]	No
E.3.d [Critical Environmental Area]	Yes
E.3.d [Critical Environmental Area - Name]	Jamaica Bay
E.3.d.ii [Critical Environmental Area - Reason]	Protect ecosystem & large number of wildlife
E.3.d.iii [Critical Environmental Area – Date and Agency]	Agency:Kings, Queens, Nassau County, Date:2-1-90
E.3.e. [National or State Register of Historic Places or State Eligible Sites]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.3.f. [Archeological Sites]	Yes
E.3.i. [Designated River Corridor]	No