Monthly Calculations (continued) JULY

Tank No.	A-5		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.80**	lb/month
		4.01E-04	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**3.14**	ft
Diameter	D	**7.40**	ft
Throughput	Q	**900**	gal/month
Turnovers	N	**10.49**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.1770708	
Partially Insulated	P_{VA}	0.1789285	
Fully Insulated	P_{VA}	0.1549312	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.232E-03	
Partially Insulated	Wv	3.257E-03	
Fully Insulated	Wv	2.867E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.41**	lb/month
Vapor Space Volume	Vv	67.5	ft3
Stock Vapor Density	Wv	0.0032	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	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.39**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.1771	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0612**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°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	0.1771	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**67.54**	ft3
Effective Tank diameter	D_E	7.40	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.803

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)	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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	0.2042	0.1053	0.0989	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	0.5987	0.3089	0.2899	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-5		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.72**	lb/month
		3.61E-04	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**3.14**	ft
Diameter	D	**7.40**	ft
Throughput	Q	**900**	gal/month
Turnovers	N	**10.49**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.1654054	
Partially Insulated	P_{VA}	0.1669398	
Fully Insulated	P_{VA}	0.1469906	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.033E-03	
Partially Insulated	Wv	3.054E-03	
Fully Insulated	Wv	2.728E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.36**	lb/month
Vapor Space Volume	Vv	67.5	ft3
Stock Vapor Density	Wv	0.0030	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**	**0.36**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.1654	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	32.39	°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	0.1654	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	**°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	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**67.54**	ft3
Effective Tank diameter	D_E	7.40	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.722

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)	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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	0.1837	0.0908	0.0928	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	0.5381	0.2661	0.2720	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-5		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.50**	lb/month
		2.51E-04	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**3.14**	ft
Diameter	D	**7.40**	ft
Throughput	Q	**900**	gal/month
Turnovers	N	**10.83**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.1210074	
Partially Insulated	P_{VA}	0.1219369	
Fully Insulated	P_{VA}	0.1097506	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-03	
Partially Insulated	Wv	2.274E-03	
Fully Insulated	Wv	2.071E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.23**	lb/month
Vapor Space Volume	Vv	67.5	ft3
Stock Vapor Density	Wv	0.0023	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.27**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0023	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	0.1210	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0501**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°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	0.1210	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**67.54**	ft3
Effective Tank diameter	D_E	7.40	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.501

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)	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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	0.1278	0.0585	0.0694	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	0.3736	0.1709	0.2026	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	A-5						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.12**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.29**	lb/month	Vapor Space Volume	Vv	67.5	ft3
		1.47E-04	ton/month	Stock Vapor Density	Wv	0.0014	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.17**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.0743	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0410**	**per day**
Diameter	D	**7.40**	ft	Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Throughput	Q	**900**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.49**	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	0.0743	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.23	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**23.18**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**21.33**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	519.02	°R
Not Insulated	P_{VA}	0.0742607		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated	P_{VA}	0.0746743					
Fully Insulated	P_{VA}	0.0691909		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	508.05	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°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**	**67.54**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R	Effective Tank diameter	D_E	7.40	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**511.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.427E-03					
Partially Insulated	Wv	1.433E-03					
Fully Insulated	Wv	1.339E-03					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.294**
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)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.0753	0.0313	0.0439	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	0.2190	0.0912	0.1278	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	A-5						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.06**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.17**	lb/month	Vapor Space Volume	Vv	67.5	ft3
		8.62E-05	ton/month	Stock Vapor Density	Wv	0.0010	lb/ft3
Time Period		**November**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.12**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.0487	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0294**	**per day**
Diameter	D	**7.40**	ft	Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Throughput	Q	**900**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.83**	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	0.0487	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	501.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.83**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.31**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	506.11	°R
Not Insulated	P_{VA}	0.0487139		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated	P_{VA}	0.0488875					
Fully Insulated	P_{VA}	0.0465605		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	498.17	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°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**	**67.54**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R	Effective Tank diameter	D_E	7.40	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**500.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	9.584E-04					
Partially Insulated	Wv	9.611E-04					
Fully Insulated	Wv	9.200E-04					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.172**
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)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.0442	0.0146	0.0296	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	0.1282	0.0425	0.0857	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	A-5						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.11**	lb/month	Vapor Space Volume	Vv	67.5	ft3
		5.41E-05	ton/month	Stock Vapor Density	Wv	0.0006	lb/ft3
Time Period		**December**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.08**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0006	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	0.0311	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0251**	**per day**
Diameter	D	**7.40**	ft	Average Daily Vapor Temperature Range	ΔTv	14.35	°R
Throughput	Q	**900**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.49**	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	0.0311	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	490.51	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	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**	**14.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**13.00**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	494.10	°R
Not Insulated	P_{VA}	0.0310854		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated	P_{VA}	0.0311782					
Fully Insulated	P_{VA}	0.0299307		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	487.34	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°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**	**67.54**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R	Effective Tank diameter	D_E	7.40	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**489.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	6.260E-04					
Partially Insulated	Wv	6.275E-04					
Fully Insulated	Wv	6.049E-04					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.108**
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)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.0278	0.0085	0.0193	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.0804	0.0245	0.0560	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	A-6		Tank type	Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.82	lb/yr
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.83	lb/year	Vapor Space Volume	Vv	34.0	ft3
		0.00	ton/year	Stock Vapor Density	Wv	0.0014	lb/ft3
Time Period		Annual		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Nearest US Location		Albany, NY		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1180.0	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	365	days/year
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	1.02	lb/yr
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	722	ft3/yr
Product Type		Gasoline Additive		Working Loss Turnover Factor	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	B	0.0	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0733	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Effective Height H_E = (Pi)D/4	H_E	3.14	ft	Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0468	per day
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	5.25	ft	Average Daily Vapor Temperature Range	ΔTv	26.15	°R
Throughput	Q	5,400	gal/yr	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	10.60	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
				Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0733	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	0.0625	ft/ft	Average Daily Liquid Surface Temperature	TLA	512.85	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	NA	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	3.14	ft				
Minimum Filling Height (use 0 if unknown)	HLN	0.00	ft	Average Daily Vapor Temperature Range (ΔTv)			
Liquid height (assume 1/2 H_E)	HL	1.57	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Tank Insulation (pick from drop down list)		Not Insulated		Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	26.15	°R
Tank Construction (pick from drop down list)		Welded		Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	24.37	°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	0.00000	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[A	PVX	1.00000	psia
	PBV	-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
True Vapor Pressure; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))				Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Not Insulated	P_{VA}	0.07325926		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°R
Partially Insulated	P_{VA}	0.07380657					
Fully Insulated	P_{VA}	0.06662447		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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	508.20	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°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	34.03	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	512.85	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.06	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	TLA	510.3		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.98	°R				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.87	°R				
Fully Insulated; Tv = TB	Tv	510.25	°R				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.407E-03					
Partially Insulated	Wv	1.416E-03					
Fully Insulated	Wv	1.292E-03					

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	additive						
Total HAP Emissions =	1.835						
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	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	0.4692	106.17	106	0.25574	0.018735	0.073	0.25574
xylenes	1.3656	106.17	106	0.74426	0.054524	0.073	0.74426
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	0.00E+00
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	A-6		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.05	lb/month
		2.35E-05	ton/month
Time Period		January	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	532.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	5.25	ft
Throughput	Q	450	gal/month
Turnovers	N	10.40	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.02513171	
Partially Insulated	P_{VA}	0.02522891	
Fully Insulated	P_{VA}	0.02392845	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	483.25	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	485.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	485.44	°R
Fully Insulated: TLA = TB	TLA	484.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	486.30	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	486.71	°R
Fully Insulated; Tv = TB	Tv	484.18	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.113E-04	
Partially Insulated	Wv	5.129E-04	
Fully Insulated	Wv	4.890E-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	34.0	ft3
Stock Vapor Density	Wv	0.0005	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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	60	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	0.0005	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	0.0251	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0301	per day
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0251	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.60	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.11	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	34.03	ft3
Effective Tank diameter	D_E	5.25	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.047
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.0121	0.0042	0.0079	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.0349	0.0121	0.0228	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) FEBRUARY

Tank No.	A-6		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.06	lb/month
		2.82E-05	ton/month
Time Period		February	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	789.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	5.25	ft
Throughput	Q	450	gal/month
Turnovers	N	11.52	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.02911926	
Partially Insulated	P_{VA}	0.02928334	
Fully Insulated	P_{VA}	0.02710937	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	485.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	488.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	489.05	°R
Fully Insulated: TLA = TB	TLA	487.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	490.33	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	490.93	°R
Fully Insulated; Tv = TB	Tv	487.17	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.876E-04	
Partially Insulated	Wv	5.902E-04	
Fully Insulated	Wv	5.506E-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	34.0	ft3
Stock Vapor Density	Wv	0.0006	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	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	60	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	0.0006	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	0.0291	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0375	per day
Average Daily Vapor Temperature Range	ΔTv	20.35	°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	0.0291	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	20.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	18.75	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	34.03	ft3
Effective Tank diameter	D_E	5.25	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.056
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.0145	0.0054	0.0091	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.0419	0.0156	0.0263	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) MARCH

Tank No.	A-6		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.09	lb/month
		4.68E-05	ton/month
Time Period		March	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1096.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	5.25	ft
Throughput	Q	450	gal/month
Turnovers	N	10.40	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.04375479	
Partially Insulated	P_{VA}	0.04407997	
Fully Insulated	P_{VA}	0.03981282	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	494.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	499.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	499.31	°R
Fully Insulated: TLA = TB	TLA	496.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	501.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	501.92	°R
Fully Insulated; Tv = TB	Tv	496.71	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.639E-04	
Partially Insulated	Wv	8.689E-04	
Fully Insulated	Wv	7.930E-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	34.0	ft3
Stock Vapor Density	Wv	0.0009	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	0.05	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0438	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0457	per day
Average Daily Vapor Temperature Range	ΔTv	24.89	°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	0.0438	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	24.89	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	23.15	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	34.03	ft3
Effective Tank diameter	D_E	5.25	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.094
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.0240	0.0107	0.0133	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	0.0696	0.0310	0.0386	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	A-6		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.17	lb/month
		8.47E-05	ton/month
Time Period		April	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1496.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	5.25	ft
Throughput	Q	450	gal/month
Turnovers	N	10.75	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.07458828	
Partially Insulated	P_{VA}	0.07529363	
Fully Insulated	P_{VA}	0.06613611	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.61	°R
Fully Insulated: TLA = TB	TLA	510.1	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	516.04	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	517.17	°R
Fully Insulated; Tv = TB	Tv	510.05	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.08	lb/month
Vapor Space Volume	Vv	34.0	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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	60	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0571	per day
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	31.42	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	29.41	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	34.03	ft3
Effective Tank diameter	D_E	5.25	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.169

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)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.0433	0.0213	0.0220	106.17	106	0.25571	0.019073	0.075	**0.25571**
xylenes	0.1260	0.0620	0.0640	106.17	106	0.74429	0.055515	0.075	**0.74429**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	A-6		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.26	lb/month
		1.31E-04	ton/month
Time Period		May	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1739.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	5.25	ft
Throughput	Q	450	gal/month
Turnovers	N	10.40	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.11144355	
Partially Insulated	P_{VA}	0.11260328	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	517.90	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	524.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	525.06	°R
Fully Insulated: TLA = TB	TLA	520.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	527.89	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	529.20	°R
Fully Insulated; Tv = TB	Tv	520.93	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.14	lb/month
Vapor Space Volume	Vv	34.0	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	60	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0623	per day
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	34.87	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	32.77	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	34.03	ft3
Effective Tank diameter	D_E	5.25	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.263

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)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	0.0671	0.0350	0.0320	106.17	106	0.25510	0.028429	0.111	**0.25510**
xylenes	0.1959	0.1023	0.0936	106.17	106	0.74490	0.083014	0.111	**0.74490**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	**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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	A-6		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.35	lb/month
		1.76E-04	ton/month
Time Period		June	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1853.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	5.25	ft
Throughput	Q	450	gal/month
Turnovers	N	10.75	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.1556972	
Partially Insulated	P_{VA}	0.15734425	
Fully Insulated	P_{VA}	0.13607975	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	527.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	534.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	535.08	°R
Fully Insulated: TLA = TB	TLA	530.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	538.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	539.49	°R
Fully Insulated; Tv = TB	Tv	530.67	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.18	lb/month
Vapor Space Volume	Vv	34.0	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	0.17	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0618	per day
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.28	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.31	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	34.03	ft3
Effective Tank diameter	D_E	5.25	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.353

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)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	0.0898	0.0460	0.0438	106.17	106	0.25456	0.039634	0.156	**0.25456**
xylenes	0.2630	0.1347	0.1284	106.17	106	0.74544	0.116064	0.156	**0.74544**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	**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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	A-6						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.21**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.40**	lb/month	Vapor Space Volume	Vv	34.0	ft3
		2.02E-04	ton/month	Stock Vapor Density	Wv	0.0032	lb/ft3
Time Period		**July**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.19**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0032	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	0.1771	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0612**	**per day**
Diameter	D	**5.25**	ft	Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.40**	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	0.1771	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	538.73	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.23**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.30**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	547.54	°R
Not Insulated	P_{VA}	0.1770708		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated	P_{VA}	0.17892849					
Fully Insulated	P_{VA}	0.15493119		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°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**	**34.03**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**534.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.232E-03					
Partially Insulated	Wv	3.257E-03					
Fully Insulated	Wv	2.867E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.403**
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)	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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	0.1025	0.0531	0.0494	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	0.3006	0.1556	0.1449	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-6						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.18**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.36**	lb/month	Vapor Space Volume	Vv	34.0	ft3
		1.81E-04	ton/month	Stock Vapor Density	Wv	0.0030	lb/ft3
Time Period		**August**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.056	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	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	60	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	0.1654	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0562**	**per day**
Diameter	D	**5.25**	ft	Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.40**	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	0.1654	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	536.62	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**32.39**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**30.48**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	544.72	°R
Not Insulated	P_{VA}	0.16540538		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated	P_{VA}	0.16693979					
Fully Insulated	P_{VA}	0.14699061		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°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**	**34.03**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**533.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.033E-03					
Partially Insulated	Wv	3.054E-03					
Fully Insulated	Wv	2.728E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.362**
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)	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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	0.0922	0.0458	0.0464	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	0.2701	0.1341	0.1360	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-6						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.12**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.25**	lb/month	Vapor Space Volume	Vv	34.0	ft3
		1.26E-04	ton/month	Stock Vapor Density	Wv	0.0023	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.14**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0023	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	0.1210	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0501**	**per day**
Diameter	D	**5.25**	ft	Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.75**	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	0.1210	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	527.18	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**28.59**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**26.66**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	534.32	°R
Not Insulated	P_{VA}	0.12100742		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated	P_{VA}	0.12193693					
Fully Insulated	P_{VA}	0.10975059		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°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**	**34.03**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**524.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.261E-03					
Partially Insulated	Wv	2.274E-03					
Fully Insulated	Wv	2.071E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.252**
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)	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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	0.0641	0.0295	0.0347	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	0.1874	0.0861	0.1013	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	A-6						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.06**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.15**	lb/month	Vapor Space Volume	Vv	34.0	ft3
		7.38E-05	ton/month	Stock Vapor Density	Wv	0.0014	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.09**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0743	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0410**	**per day**
Diameter	D	**5.25**	ft	Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.40**	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	0.0743	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.23	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**23.18**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**21.33**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	519.02	°R
Not Insulated	P_{VA}	0.0742607		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated	P_{VA}	0.07467428					
Fully Insulated	P_{VA}	0.06919088		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°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**	**34.03**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**511.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.427E-03					
Partially Insulated	Wv	1.433E-03					
Fully Insulated	Wv	1.339E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.148**
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)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.0377	0.0158	0.0220	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	0.1099	0.0460	0.0639	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	A-6						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.09**	lb/month	Vapor Space Volume	Vv	34.0	ft3
		4.32E-05	ton/month	Stock Vapor Density	Wv	0.0010	lb/ft3
Time Period		**November**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.06**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0487	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0294**	**per day**
Diameter	D	**5.25**	ft	Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.75**	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	0.0487	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	501.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.83**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.31**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	506.11	°R
Not Insulated	P_{VA}	0.04871392		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated	P_{VA}	0.04888755					
Fully Insulated	P_{VA}	0.04656051		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°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**	**34.03**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**500.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	9.584E-04					
Partially Insulated	Wv	9.611E-04					
Fully Insulated	Wv	9.200E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.086**
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)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.0222	0.0074	0.0148	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	0.0643	0.0214	0.0429	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	A-6						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.02**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.05**	lb/month	Vapor Space Volume	Vv	34.0	ft3
		2.71E-05	ton/month	Stock Vapor Density	Wv	0.0006	lb/ft3
Time Period		**December**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.04**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0006	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	0.0311	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0251**	**per day**
Diameter	D	**5.25**	ft	Average Daily Vapor Temperature Range	ΔTv	14.35	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.40**	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	0.0311	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	490.51	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	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**	**14.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**13.00**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	494.10	°R
Not Insulated	P_{VA}	0.03108539		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated	P_{VA}	0.03117819					
Fully Insulated	P_{VA}	0.02993067		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°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**	**34.03**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R	Effective Tank diameter	D_E	5.25	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**489.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	6.260E-04					
Partially Insulated	Wv	6.275E-04					
Fully Insulated	Wv	6.049E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.054**
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)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.0139	0.0043	0.0097	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.0403	0.0123	0.0280	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	A-7		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**29.18**	lb/year
		0.01	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**14.73**	ft
Throughput	Q	**86,652**	gal/yr
Turnovers	N	**10.82**	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	**6.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.07325926	
Partially Insulated	P_{VA}	0.07380657	
Fully Insulated	P_{VA}	0.06662447	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.88**	lb/yr
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**16.30**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	11,582	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0468**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**535.33**	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/yr						
Product	additive						
Total HAP Emissions =	**29.184**	**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	106	0.00000	0.000000	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	7.4633	106.17	106	0.25574	0.018735	0.073	**0.25574**
xylenes	21.7203	106.17	106	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.75	lb/month
		3.74E-04	ton/month
Time Period		January	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	532.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.73	ft
Throughput	Q	7,221	gal/month
Turnovers	N	10.61	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 (If unknown use (Pi/4)D	HLX	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.02513171	
Partially Insulated	P_{VA}	0.02522891	
Fully Insulated	P_{VA}	0.02392845	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	483.25	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	485.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	485.44	°R
Fully Insulated: TLA = TB	TLA	484.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	486.30	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	486.71	°R
Fully Insulated; Tv = TB	Tv	484.18	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.113E-04	
Partially Insulated	Wv	5.129E-04	
Fully Insulated	Wv	4.890E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.26	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0005	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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	0.49	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0005	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	0.0251	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0301	per day
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0251	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.60	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.11	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	535.33	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.749
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.1925	0.0656	0.1269	106.17	106	0.25714	0.006462	0.025	0.25714
xylenes	0.5562	0.1896	0.3666	106.17	106	0.74286	0.018669	0.025	0.74286
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.90	lb/month
		4.49E-04	ton/month
Time Period		February	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	789.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.73	ft
Throughput	Q	7,221	gal/month
Turnovers	N	11.75	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.02911926	
Partially Insulated	P_{VA}	0.02928334	
Fully Insulated	P_{VA}	0.02710937	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	485.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	488.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	489.05	°R
Fully Insulated: TLA = TB	TLA	487.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	490.33	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	490.93	°R
Fully Insulated; Tv = TB	Tv	487.17	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.876E-04	
Partially Insulated	Wv	5.902E-04	
Fully Insulated	Wv	5.506E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.33	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0006	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	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.57	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0006	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	0.0291	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0375	per day
Average Daily Vapor Temperature Range	ΔTv	20.35	°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	0.0291	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	20.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	18.75	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	535.33	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.897
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.2306	0.0849	0.1457	106.17	106	0.25696	0.007483	0.029	0.25696
xylenes	0.6668	0.2454	0.4214	106.17	106	0.74304	0.021637	0.029	0.74304
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.49	lb/month
		7.45E-04	ton/month
Time Period		March	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1096.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.73	ft
Throughput	Q	7,221	gal/month
Turnovers	N	10.61	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.04375479	
Partially Insulated	P_{VA}	0.04407997	
Fully Insulated	P_{VA}	0.03981282	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	494.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	499.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	499.31	°R
Fully Insulated: TLA = TB	TLA	496.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	501.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	501.92	°R
Fully Insulated; Tv = TB	Tv	496.71	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.639E-04	
Partially Insulated	Wv	8.689E-04	
Fully Insulated	Wv	7.930E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.66	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0009	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	0.83	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0438	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0457	per day
Average Daily Vapor Temperature Range	ΔTv	24.89	°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	0.0438	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	24.89	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	23.15	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	535.33	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.490
Eq. 40-2 $L_{Ti}=Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.3820	0.1682	0.2138	106.17	106	0.25645	0.011221	0.044	0.25645
xylenes	1.1076	0.4876	0.6200	106.17	106	0.74355	0.032534	0.044	0.74355
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) — APRIL

Tank No.	A-7						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.31**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.69**	lb/month	Vapor Space Volume	Vv	535.3	ft3
		1.35E-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	0.057	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.38**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0746	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0571**	**per day**
Diameter	D	**14.73**	ft	Average Daily Vapor Temperature Range	ΔTv	31.42	°R
Throughput	Q	**7,221**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.97**	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	0.0746	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.35	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**31.42**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**29.41**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	521.21	°R
Not Insulated	P_{VA}	0.07458828		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°R
Partially Insulated	P_{VA}	0.07529363					
Fully Insulated	P_{VA}	0.06613611		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°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**	**535.33**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R	Effective Tank diameter	D_E	14.73	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**510.1**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.430E-03					
Partially Insulated	Wv	1.440E-03					
Fully Insulated	Wv	1.283E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**2.691**
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)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.6881	0.3351	0.3530	106.17	106	0.25571	0.019073	0.075	**0.25571**
xylenes	2.0028	0.9755	1.0273	106.17	106	0.74429	0.055515	0.075	**0.74429**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) — MAY

Tank No.	A-7						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.16**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.18**	lb/month	Vapor Space Volume	Vv	535.3	ft3
		2.09E-03	ton/month	Stock Vapor Density	Wv	0.0021	lb/ft3
Time Period		**May**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.02**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0021	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	0.1114	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0623**	**per day**
Diameter	D	**14.73**	ft	Average Daily Vapor Temperature Range	ΔTv	34.87	°R
Throughput	Q	**7,221**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.61**	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	0.1114	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	524.76	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**34.87**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**32.77**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	533.48	°R
Not Insulated	P_{VA}	0.11144355		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°R
Partially Insulated	P_{VA}	0.11260328					
Fully Insulated	P_{VA}	0.0976197		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°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**	**535.33**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R	Effective Tank diameter	D_E	14.73	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**520.9**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.089E-03					
Partially Insulated	Wv	2.105E-03					
Fully Insulated	Wv	1.854E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**4.175**
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)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	1.0652	0.5509	0.5143	106.17	106	0.25510	0.028429	0.111	**0.25510**
xylenes	3.1103	1.6086	1.5017	106.17	106	0.74490	0.083014	0.111	**0.74490**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	**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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) — JUNE

Tank No.	A-7						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.84**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.61**	lb/month	Vapor Space Volume	Vv	535.3	ft3
		2.80E-03	ton/month	Stock Vapor Density	Wv	0.0029	lb/ft3
Time Period		**June**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.76**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0029	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	0.1557	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0618**	**per day**
Diameter	D	**14.73**	ft	Average Daily Vapor Temperature Range	ΔTv	35.28	°R
Throughput	Q	**7,221**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.97**	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	0.1557	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	534.76	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.28**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.31**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	543.58	°R
Not Insulated	P_{VA}	0.1556972		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°R
Partially Insulated	P_{VA}	0.15734425					
Fully Insulated	P_{VA}	0.13607975		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°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**	**535.33**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R	Effective Tank diameter	D_E	14.73	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**530.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.863E-03					
Partially Insulated	Wv	2.886E-03					
Fully Insulated	Wv	2.537E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.605**
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)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	1.4268	0.7234	0.7034	106.17	106	0.25456	0.039634	0.156	**0.25456**
xylenes	4.1783	2.1185	2.0598	106.17	106	0.74544	0.116064	0.156	**0.74544**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	**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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**6.40**	lb/month
		3.20E-03	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.73**	ft
Throughput	Q	**7,221**	gal/month
Turnovers	N	**10.61**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.1770708	
Partially Insulated	P_{VA}	0.17892849	
Fully Insulated	P_{VA}	0.15493119	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	°R
Fully Insulated; Tv = TB	**Tv**	**534.61**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.232E-03	
Partially Insulated	Wv	3.257E-03	
Fully Insulated	Wv	2.867E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.28**	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0032	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	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.12**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.1771	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0612**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°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	0.1771	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**535.33**	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**6.402**
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)	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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	1.6283	0.8349	0.7933	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	4.7737	2.4478	2.3259	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.76**	lb/month
		2.88E-03	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.73**	ft
Throughput	Q	**7,221**	gal/month
Turnovers	N	**10.61**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.16540538	
Partially Insulated	P_{VA}	0.16693979	
Fully Insulated	P_{VA}	0.14699061	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	°R
Fully Insulated; Tv = TB	**Tv**	**533.00**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.033E-03	
Partially Insulated	Wv	3.054E-03	
Fully Insulated	Wv	2.728E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.83**	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0030	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**	**2.93**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.1654	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	32.39	°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	0.1654	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	°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	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**535.33**	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.756**
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)	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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	1.4646	0.7197	0.7449	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	4.2913	2.1088	2.1825	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.00**	lb/month
		2.00E-03	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.73**	ft
Throughput	Q	**7,221**	gal/month
Turnovers	N	**10.97**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.12100742	
Partially Insulated	P_{VA}	0.12193693	
Fully Insulated	P_{VA}	0.10975059	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	°R
Fully Insulated; Tv = TB	**Tv**	**524.31**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-03	
Partially Insulated	Wv	2.274E-03	
Fully Insulated	Wv	2.071E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.82**	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0023	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.18**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0023	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	0.1210	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0501**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°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	0.1210	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**535.33**	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**4.001**
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)	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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	1.0200	0.4636	0.5564	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	2.9805	1.3546	1.6259	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	2.35	lb/month
		1.17E-03	ton/month
Time Period		October	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	882.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.73	ft
Throughput	Q	7,221	gal/month
Turnovers	N	10.61	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.0742607	
Partially Insulated	P_{VA}	0.07467428	
Fully Insulated	P_{VA}	0.06919088	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	509.75	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.23	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.38	°R
Fully Insulated: TLA = TB	TLA	511.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.81	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.48	°R
Fully Insulated; Tv = TB	Tv	511.28	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.427E-03	
Partially Insulated	Wv	1.433E-03	
Fully Insulated	Wv	1.339E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.97	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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	1.38	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0743	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0410	per day
Average Daily Vapor Temperature Range	ΔTv	23.18	°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	0.0743	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	23.18	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	21.33	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	535.33	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	2.349

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)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.6007	0.2484	0.3522	106.17	106	0.25572	0.018990	0.074	0.25572
xylenes	1.7484	0.7231	1.0252	106.17	106	0.74428	0.055271	0.074	0.74428
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.38	lb/month
		6.89E-04	ton/month
Time Period		November	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	534.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.73	ft
Throughput	Q	7,221	gal/month
Turnovers	N	10.97	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.04871392	
Partially Insulated	P_{VA}	0.04888755	
Fully Insulated	P_{VA}	0.04656051	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	499.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	501.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	502.00	°R
Fully Insulated: TLA = TB	TLA	500.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.87	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	503.27	°R
Fully Insulated; Tv = TB	Tv	500.73	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.584E-04	
Partially Insulated	Wv	9.611E-04	
Fully Insulated	Wv	9.200E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.45	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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	0.93	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0487	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0294	per day
Average Daily Vapor Temperature Range	ΔTv	16.83	°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	0.0487	psia
Average Daily Liquid Surface Temperature	TLA	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.83	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.31	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	535.33	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.378

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)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.3531	0.1160	0.2371	106.17	106	0.25631	0.012486	0.049	0.25631
xylenes	1.0246	0.3366	0.6880	106.17	106	0.74369	0.036228	0.049	0.74369
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	A-7		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.87	lb/month
		4.33E-04	ton/month
Time Period		December	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	422.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.73	ft
Throughput	Q	7,221	gal/month
Turnovers	N	10.61	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.03108539	
Partially Insulated	P_{VA}	0.03117819	
Fully Insulated	P_{VA}	0.02993067	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	488.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	490.51	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	490.59	°R
Fully Insulated: TLA = TB	TLA	489.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	491.27	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	491.59	°R
Fully Insulated; Tv = TB	Tv	489.58	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.260E-04	
Partially Insulated	Wv	6.275E-04	
Fully Insulated	Wv	6.049E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.26	lb/month
Vapor Space Volume	Vv	535.3	ft3
Stock Vapor Density	Wv	0.0006	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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	0.60	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	965	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	0.0006	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	0.0311	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0251	per day
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0311	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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	14.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	13.00	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	535.33	ft3
Effective Tank diameter	D_E	14.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.865

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)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.2222	0.0670	0.1552	106.17	106	0.25688	0.007985	0.031	0.25688
xylenes	0.6429	0.1939	0.4490	106.17	106	0.74312	0.023100	0.031	0.74312
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	A-Generic		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**29.16**	lb/year
		0.01	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**14.74**	ft
Throughput	Q	**86,400**	gal/yr
Turnovers	N	**10.77**	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	**6.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.07325926	
Partially Insulated	P_{VA}	0.07380657	
Fully Insulated	P_{VA}	0.06662447	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.90**	lb/yr
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**16.25**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	11,549	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0468**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/yr**						
Product	additive						
Total HAP Emissions =	**29.156**	**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	106	0.00000	0.000000	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	7.4563	106.17	106	0.25574	0.018735	0.073	**0.25574**
xylenes	21.7001	106.17	106	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.75**	lb/month
		3.74E-04	ton/month
Time Period		**January**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.02513171	
Partially Insulated	P_{VA}	0.02522891	
Fully Insulated	P_{VA}	0.02392845	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R
Fully Insulated: TLA = TB	**TLA**	**484.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.113E-04	
Partially Insulated	Wv	5.129E-04	
Fully Insulated	Wv	4.890E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.26**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0005	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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**	**0.49**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0005	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	0.0251	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0301**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0251	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.60**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.11**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.748
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)	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	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.1922	0.0657	0.1265	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.5554	0.1899	0.3655	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) FEBRUARY

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.90**	lb/month
		4.48E-04	ton/month
Time Period		**February**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**11.70**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.02911926	
Partially Insulated	P_{VA}	0.02928334	
Fully Insulated	P_{VA}	0.02710937	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R
Fully Insulated: TLA = TB	**TLA**	**487.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.876E-04	
Partially Insulated	Wv	5.902E-04	
Fully Insulated	Wv	5.506E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.33**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0006	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	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.57**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0006	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	0.0291	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0375**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.35	°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	0.0291	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.75**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.896
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)	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	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.2303	0.0850	0.1453	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.6659	0.2458	0.4202	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) MARCH

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.49**	lb/month
		7.44E-04	ton/month
Time Period		**March**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.04375479	
Partially Insulated	P_{VA}	0.04407997	
Fully Insulated	P_{VA}	0.03981282	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R
Fully Insulated: TLA = TB	**TLA**	**496.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.639E-04	
Partially Insulated	Wv	8.689E-04	
Fully Insulated	Wv	7.930E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.66**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0009	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**	**0.83**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0438	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0457**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.89	°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	0.0438	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.15**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.488
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)	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	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.3816	0.1684	0.2132	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	1.1065	0.4883	0.6182	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) — APRIL

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.69**	lb/month
		1.34E-03	ton/month
Time Period		**April**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.92**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.07458828	
Partially Insulated	P_{VA}	0.07529363	
Fully Insulated	P_{VA}	0.06613611	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R
Fully Insulated: TLA = TB	**TLA**	**510.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-03	

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	536.2	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**1.38**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0571**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.42**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.41**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**2.689**

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)**	**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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.6876	0.3357	0.3519	106.17	106	0.25571	0.019073	0.075	**0.25571**
xylenes	2.0014	0.9770	1.0243	106.17	106	0.74429	0.055515	0.075	**0.74429**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) — MAY

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.17**	lb/month
		2.09E-03	ton/month
Time Period		**May**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.11144355	
Partially Insulated	P_{VA}	0.11260328	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R
Fully Insulated: TLA = TB	**TLA**	**520.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.16**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**2.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0623**	**per day**
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**34.87**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**32.77**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**4.173**

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)**	**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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	1.0645	0.5517	0.5128	106.17	106	0.25510	0.028429	0.111	**0.25510**
xylenes	3.1084	1.6111	1.4974	106.17	106	0.74490	0.083014	0.111	**0.74490**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	**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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) — JUNE

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.60**	lb/month
		2.80E-03	ton/month
Time Period		**June**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.92**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.1556972	
Partially Insulated	P_{VA}	0.15734425	
Fully Insulated	P_{VA}	0.13607975	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R
Fully Insulated: TLA = TB	**TLA**	**530.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.85**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**2.76**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0618**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.28**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.602**

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)**	**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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	1.4259	0.7246	0.7013	106.17	106	0.25456	0.039634	0.156	**0.25456**
xylenes	4.1756	2.1218	2.0538	106.17	106	0.74544	0.116064	0.156	**0.74544**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	**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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	A-Generic						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.29**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**6.40**	lb/month	Vapor Space Volume	Vv	536.2	ft3
		3.20E-03	ton/month	Stock Vapor Density	Wv	0.0032	lb/ft3
Time Period		**July**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.11**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0032	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	0.1771	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0612**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Throughput	Q	**7,200**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.57**	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	0.1771	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	538.73	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.23**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.30**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	547.54	°R
Not Insulated	P_{VA}	0.1770708		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated	P_{VA}	0.17892849					
Fully Insulated	P_{VA}	0.15493119		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°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**	**536.17**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°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**	**539.06**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**534.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.232E-03					
Partially Insulated	Wv	3.257E-03					
Fully Insulated	Wv	2.867E-03					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**6.398**

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)	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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	1.6273	0.8362	0.7910	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	4.7708	2.4517	2.3191	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-Generic						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.83**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.75**	lb/month	Vapor Space Volume	Vv	536.2	ft3
		2.88E-03	ton/month	Stock Vapor Density	Wv	0.0030	lb/ft3
Time Period		**August**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.056	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.92**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.1654	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0562**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Throughput	Q	**7,200**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.57**	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	0.1654	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	536.62	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**32.39**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**30.48**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	544.72	°R
Not Insulated	P_{VA}	0.16540538		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated	P_{VA}	0.16693979					
Fully Insulated	P_{VA}	0.14699061		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°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**	**536.17**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°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**	**536.90**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**533.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.033E-03					
Partially Insulated	Wv	3.054E-03					
Fully Insulated	Wv	2.728E-03					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**5.752**

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)	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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	1.4636	0.7208	0.7427	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	4.2882	2.1121	2.1762	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-Generic						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.82**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.00**	lb/month	Vapor Space Volume	Vv	536.2	ft3
		2.00E-03	ton/month	Stock Vapor Density	Wv	0.0023	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.18**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0023	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	0.1210	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0501**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Throughput	Q	**7,200**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.92**	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	0.1210	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	527.18	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**28.59**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**26.66**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	534.32	°R
Not Insulated	P_{VA}	0.12100742		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated	P_{VA}	0.12193693					
Fully Insulated	P_{VA}	0.10975059		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°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**	**536.17**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°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**	**527.40**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**524.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.261E-03					
Partially Insulated	Wv	2.274E-03					
Fully Insulated	Wv	2.071E-03					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**3.997**

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)	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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	1.0191	0.4643	0.5548	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	2.9779	1.3568	1.6212	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.35**	lb/month
		1.17E-03	ton/month
Time Period		**October**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.0742607	
Partially Insulated	P_{VA}	0.07467428	
Fully Insulated	P_{VA}	0.06919088	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R
Fully Insulated: TLA = TB	**TLA**	**511.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.427E-03	
Partially Insulated	Wv	1.433E-03	
Fully Insulated	Wv	1.339E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.97**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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**	**1.37**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0743	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0410**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.18	°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	0.0743	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.18**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**21.33**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**2.347**

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)**	**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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.6001	0.2488	0.3512	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	1.7465	0.7243	1.0223	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.38**	lb/month
		6.88E-04	ton/month
Time Period		**November**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.92**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.04871392	
Partially Insulated	P_{VA}	0.04888755	
Fully Insulated	P_{VA}	0.04656051	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R
Fully Insulated: TLA = TB	**TLA**	**500.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.584E-04	
Partially Insulated	Wv	9.611E-04	
Fully Insulated	Wv	9.200E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.45**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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**	**0.92**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0487	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0294**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.83	°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	0.0487	psia
Average Daily Liquid Surface Temperature	TLA	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**1.376**

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)**	**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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.3526	0.1162	0.2364	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	1.0231	0.3371	0.6860	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	A-Generic		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.86**	lb/month
		4.32E-04	ton/month
Time Period		**December**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.03108539	
Partially Insulated	P_{VA}	0.03117819	
Fully Insulated	P_{VA}	0.02993067	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R
Fully Insulated: TLA = TB	**TLA**	**489.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.260E-04	
Partially Insulated	Wv	6.275E-04	
Fully Insulated	Wv	6.049E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.26**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0006	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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**	**0.60**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0006	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	0.0311	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0251**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0311	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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**	**14.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.00**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.864**

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)**	**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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.2219	0.0671	0.1548	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.6419	0.1942	0.4477	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	A-Exxon		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**14.48**	lb/year
		0.01	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**10.34**	ft
Throughput	Q	**43,200**	gal/yr
Turnovers	N	**10.94**	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	**6.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.07325926	
Partially Insulated	P_{VA}	0.07380657	
Fully Insulated	P_{VA}	0.06662447	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**6.35**	lb/yr
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**8.13**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	5,774	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0468**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/yr						
Product	additive						
Total HAP Emissions =	**14.477**	**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	106	0.00000	0.000000	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	3.7024	106.17	106	0.25574	0.018735	0.073	**0.25574**
xylenes	10.7750	106.17	106	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	A-Exxon						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.13**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.37**	lb/month	Vapor Space Volume	Vv	263.9	ft3
		1.86E-04	ton/month	Stock Vapor Density	Wv	0.0005	lb/ft3
Time Period		**January**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.25**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0005	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	0.0251	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0301**	**per day**
Diameter	D	**10.34**	ft	Average Daily Vapor Temperature Range	ΔTv	16.60	°R
Throughput	Q	**3,600**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.73**	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	0.0251	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	485.35	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height (use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.60**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.11**	°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	**0.00000**	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[A	PVX	1.00000	psia
	PBV	**-0.03**		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	489.50	°R
Not Insulated	P_{VA}	0.02513171		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°R
Partially Insulated	P_{VA}	0.02522891					
Fully Insulated	P_{VA}	0.02392845		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°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**	**263.89**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R	Effective Tank diameter	D_E	10.34	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**484.2**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	5.113E-04					
Partially Insulated	Wv	5.129E-04					
Fully Insulated	Wv	4.890E-04					

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)	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	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.0956	0.0323	0.0633	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.2762	0.0934	0.1828	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	A-Exxon						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.16**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.45**	lb/month	Vapor Space Volume	Vv	263.9	ft3
		2.23E-04	ton/month	Stock Vapor Density	Wv	0.0006	lb/ft3
Time Period		**February**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.037	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	28	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.28**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0006	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	0.0291	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0375**	**per day**
Diameter	D	**10.34**	ft	Average Daily Vapor Temperature Range	ΔTv	20.35	°R
Throughput	Q	**3,600**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**11.89**	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	0.0291	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	488.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**20.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**18.75**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	494.00	°R
Not Insulated	P_{VA}	0.02911926		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°R
Partially Insulated	P_{VA}	0.02928334					
Fully Insulated	P_{VA}	0.02710937		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°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**	**263.89**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R	Effective Tank diameter	D_E	10.34	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**487.2**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	5.876E-04					
Partially Insulated	Wv	5.902E-04					
Fully Insulated	Wv	5.506E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.446**
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)	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	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.1145	0.0418	0.0727	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.3310	0.1210	0.2101	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	A-Exxon						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.32**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.74**	lb/month	Vapor Space Volume	Vv	263.9	ft3
		3.69E-04	ton/month	Stock Vapor Density	Wv	0.0009	lb/ft3
Time Period		**March**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.42**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0009	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	0.0438	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0457**	**per day**
Diameter	D	**10.34**	ft	Average Daily Vapor Temperature Range	ΔTv	24.89	°R
Throughput	Q	**3,600**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.73**	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	0.0438	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	499.12	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**24.89**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**23.15**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	505.35	°R
Not Insulated	P_{VA}	0.04375479		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°R
Partially Insulated	P_{VA}	0.04407997					
Fully Insulated	P_{VA}	0.03981282		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°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**	**263.89**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R	Effective Tank diameter	D_E	10.34	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**496.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	8.639E-04					
Partially Insulated	Wv	8.689E-04					
Fully Insulated	Wv	7.930E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.739**
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)	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	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.1895	0.0829	0.1066	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	0.5495	0.2404	0.3091	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) — APRIL

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	A-Exxon		
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.33**	lb/month
		6.67E-04	ton/month
Time Period		**April**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**11.09**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.07458828	
Partially Insulated	P_{VA}	0.07529363	
Fully Insulated	P_{VA}	0.06613611	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R
Fully Insulated: TLA = TB	**TLA**	**510.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	°R
Fully Insulated; Tv = TB	**Tv**	**510.05**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.65**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**0.69**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0571**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.42**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.41**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.334

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)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.3412	0.1652	0.1760	106.17	106	0.25571	0.019073	0.075	**0.25571**
xylenes	0.9930	0.4809	0.5122	106.17	106	0.74429	0.055515	0.075	**0.74429**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) — MAY

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	A-Exxon		
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.07**	lb/month
		1.03E-03	ton/month
Time Period		**May**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**10.73**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.11144355	
Partially Insulated	P_{VA}	0.11260328	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R
Fully Insulated: TLA = TB	**TLA**	**520.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	°R
Fully Insulated; Tv = TB	**Tv**	**520.93**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.06**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**1.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0623**	**per day**
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**34.87**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**32.77**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	2.070

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)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	0.5279	0.2716	0.2564	106.17	106	0.25510	0.028429	0.111	**0.25510**
xylenes	1.5416	0.7929	0.7487	106.17	106	0.74490	0.083014	0.111	**0.74490**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	**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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) — JUNE

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	A-Exxon		
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.78**	lb/month
		1.39E-03	ton/month
Time Period		**June**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**11.09**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.1556972	
Partially Insulated	P_{VA}	0.15734425	
Fully Insulated	P_{VA}	0.13607975	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R
Fully Insulated: TLA = TB	**TLA**	**530.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	°R
Fully Insulated; Tv = TB	**Tv**	**530.67**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.40**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**1.38**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0618**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.28**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	2.779

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)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	0.7073	0.3566	0.3507	106.17	106	0.25456	0.039634	0.156	**0.25456**
xylenes	2.0712	1.0443	1.0269	106.17	106	0.74544	0.116064	0.156	**0.74544**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	**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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	A-Exxon		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.17**	lb/month
		1.59E-03	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**10.73**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.1770708	
Partially Insulated	P_{VA}	0.17892849	
Fully Insulated	P_{VA}	0.15493119	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.232E-03	
Partially Insulated	Wv	3.257E-03	
Fully Insulated	Wv	2.867E-03	

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	263.9	ft3
Stock Vapor Density	Wv	0.0032	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	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.56**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.1771	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0612**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°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	0.1771	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	3.173
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)	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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	0.8071	0.4116	0.3955	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	2.3662	1.2067	1.1596	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-Exxon		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.85**	lb/month
		1.43E-03	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**10.73**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.16540538	
Partially Insulated	P_{VA}	0.16693979	
Fully Insulated	P_{VA}	0.14699061	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.033E-03	
Partially Insulated	Wv	3.054E-03	
Fully Insulated	Wv	2.728E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.39**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0030	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**	**1.46**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.1654	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	32.39	°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	0.1654	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	**°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	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	2.854
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)	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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	0.7262	0.3548	0.3714	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	2.1276	1.0395	1.0881	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-Exxon		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.98**	lb/month
		9.92E-04	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**11.09**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.12100742	
Partially Insulated	P_{VA}	0.12193693	
Fully Insulated	P_{VA}	0.10975059	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-03	
Partially Insulated	Wv	2.274E-03	
Fully Insulated	Wv	2.071E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.90**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0023	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.09**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0023	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	0.1210	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0501**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°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	0.1210	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.984
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)	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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	0.5059	0.2285	0.2774	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	1.4784	0.6678	0.8106	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	A-Exxon		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.17**	lb/month
		5.83E-04	ton/month
Time Period		**October**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**10.73**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.0742607	
Partially Insulated	P_{VA}	0.07467428	
Fully Insulated	P_{VA}	0.06919088	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R
Fully Insulated: TLA = TB	**TLA**	**511.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.427E-03	
Partially Insulated	Wv	1.433E-03	
Fully Insulated	Wv	1.339E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.48**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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**	**0.69**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0743	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0410**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.18	°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	0.0743	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.18**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**21.33**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.166
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)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.2981	0.1225	0.1756	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	0.8676	0.3565	0.5111	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	A-Exxon		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.68**	lb/month
		3.42E-04	ton/month
Time Period		**November**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**11.09**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.04871392	
Partially Insulated	P_{VA}	0.04888755	
Fully Insulated	P_{VA}	0.04656051	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R
Fully Insulated: TLA = TB	**TLA**	**500.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.584E-04	
Partially Insulated	Wv	9.611E-04	
Fully Insulated	Wv	9.200E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.22**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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**	**0.46**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0487	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0294**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.83	°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	0.0487	psia
Average Daily Liquid Surface Temperature	TLA	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.684
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)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.1754	0.0572	0.1182	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	0.5089	0.1659	0.3430	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	A-Exxon		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.43**	lb/month
		2.15E-04	ton/month
Time Period		**December**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**6.28**	ft
Diameter	D	**10.34**	ft
Throughput	Q	**3,600**	gal/month
Turnovers	N	**10.73**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.03108539	
Partially Insulated	P_{VA}	0.03117819	
Fully Insulated	P_{VA}	0.02993067	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R
Fully Insulated: TLA = TB	**TLA**	**489.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.260E-04	
Partially Insulated	Wv	6.275E-04	
Fully Insulated	Wv	6.049E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.13**	lb/month
Vapor Space Volume	Vv	263.9	ft3
Stock Vapor Density	Wv	0.0006	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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**	**0.30**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	481	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	0.0006	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	0.0311	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0251**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0311	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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**	**14.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.00**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**263.89**	ft3
Effective Tank diameter	D_E	10.34	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.430
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)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.1104	0.0330	0.0774	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.3194	0.0956	0.2239	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	SA		Tank type
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**29.16**	lb/year
		0.01	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**14.74**	ft
Throughput	Q	**86,400**	gal/yr
Turnovers	N	**10.77**	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	**6.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.07325926	
Partially Insulated	P_{VA}	0.07380657	
Fully Insulated	P_{VA}	0.06662447	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**12.90**	lb/yr
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**16.25**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	11,549	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0468**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/yr**						
Product	additive						
Total HAP Emissions =	**29.156**	**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	106	0.00000	0.000000	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	7.4563	106.17	106	0.25574	0.018735	0.073	**0.25574**
xylenes	21.7001	106.17	106	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	SA		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.75**	lb/month
		3.74E-04	ton/month
Time Period		**January**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.02513171	
Partially Insulated	P_{VA}	0.02522891	
Fully Insulated	P_{VA}	0.02392845	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R
Fully Insulated: TLA = TB	**TLA**	**484.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.113E-04	
Partially Insulated	Wv	5.129E-04	
Fully Insulated	Wv	4.890E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.26**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0005	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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**	**0.49**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0005	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	0.0251	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0301**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0251	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.60**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.11**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.748**
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)**	**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	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.1922	0.0657	0.1265	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.5554	0.1899	0.3655	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	SA		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.90**	lb/month
		4.48E-04	ton/month
Time Period		**February**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**11.70**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.02911926	
Partially Insulated	P_{VA}	0.02928334	
Fully Insulated	P_{VA}	0.02710937	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R
Fully Insulated: TLA = TB	**TLA**	**487.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.876E-04	
Partially Insulated	Wv	5.902E-04	
Fully Insulated	Wv	5.506E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.33**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0006	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	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.57**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0006	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	0.0291	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0375**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.35	°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	0.0291	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.75**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.896**
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)**	**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	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.2303	0.0850	0.1453	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.6659	0.2458	0.4202	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	SA		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.49**	lb/month
		7.44E-04	ton/month
Time Period		**March**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.04375479	
Partially Insulated	P_{VA}	0.04407997	
Fully Insulated	P_{VA}	0.03981282	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R
Fully Insulated: TLA = TB	**TLA**	**496.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.639E-04	
Partially Insulated	Wv	8.689E-04	
Fully Insulated	Wv	7.930E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.66**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0009	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**	**0.83**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0438	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0457**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.89	°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	0.0438	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.15**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**1.488**
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)**	**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	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.3816	0.1684	0.2132	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	1.1065	0.4883	0.6182	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	SA		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.69**	lb/month
		1.34E-03	ton/month
Time Period		**April**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.92**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.07458828	
Partially Insulated	P_{VA}	0.07529363	
Fully Insulated	P_{VA}	0.06613611	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R
Fully Insulated: TLA = TB	**TLA**	**510.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-03	

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	536.2	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**1.38**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0571**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.42**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.41**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**2.689**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.6876	0.3357	0.3519	106.17	106	0.25571	0.019073	0.075	**0.25571**
xylenes	2.0014	0.9770	1.0243	106.17	106	0.74429	0.055515	0.075	**0.74429**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.075	**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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	SA		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.17**	lb/month
		2.09E-03	ton/month
Time Period		**May**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.57**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.11144355	
Partially Insulated	P_{VA}	0.11260328	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R
Fully Insulated: TLA = TB	**TLA**	**520.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.16**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**2.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0623**	**per day**
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**34.87**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**32.77**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**4.173**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	1.0645	0.5517	0.5128	106.17	106	0.25510	0.028429	0.111	**0.25510**
xylenes	3.1084	1.6111	1.4974	106.17	106	0.74490	0.083014	0.111	**0.74490**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	**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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	SA		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.60**	lb/month
		2.80E-03	ton/month
Time Period		**June**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**14.74**	ft
Throughput	Q	**7,200**	gal/month
Turnovers	N	**10.92**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		**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}	0.1556972	
Partially Insulated	P_{VA}	0.15734425	
Fully Insulated	P_{VA}	0.13607975	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R
Fully Insulated: TLA = TB	**TLA**	**530.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.85**	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**2.76**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0618**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.28**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**536.17**	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.602**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	1.4259	0.7246	0.7013	106.17	106	0.25456	0.039634	0.156	**0.25456**
xylenes	4.1756	2.1218	2.0538	106.17	106	0.74544	0.116064	0.156	**0.74544**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	**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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) **JULY**

Tank No.	SA						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**3.29**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**6.40**	lb/month	Vapor Space Volume	Vv	536.2	ft3
		3.20E-03	ton/month	Stock Vapor Density	Wv	0.0032	lb/ft3
Time Period		**July**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**3.11**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0032	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	0.1771	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0612**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Throughput	Q	**7,200**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.57**	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	0.1771	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	538.73	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.23**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.30**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	547.54	°R
Not Insulated	P_{VA}	0.1770708		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated	P_{VA}	0.17892849					
Fully Insulated	P_{VA}	0.15493119		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°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**	**536.17**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°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**	**539.06**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**534.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.232E-03					
Partially Insulated	Wv	3.257E-03					
Fully Insulated	Wv	2.867E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**6.398**
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)**	**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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	1.6273	0.8362	0.7910	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	4.7708	2.4517	2.3191	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) **AUGUST**

Tank No.	SA						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.83**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.75**	lb/month	Vapor Space Volume	Vv	536.2	ft3
		2.88E-03	ton/month	Stock Vapor Density	Wv	0.0030	lb/ft3
Time Period		**August**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.056	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.92**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.1654	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0562**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Throughput	Q	**7,200**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.57**	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	0.1654	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	536.62	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**32.39**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**30.48**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	544.72	°R
Not Insulated	P_{VA}	0.16540538		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated	P_{VA}	0.16693979					
Fully Insulated	P_{VA}	0.14699061		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°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**	**536.17**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°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**	**536.90**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**533.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.033E-03					
Partially Insulated	Wv	3.054E-03					
Fully Insulated	Wv	2.728E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.752**
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)**	**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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	1.4636	0.7208	0.7427	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	4.2882	2.1121	2.1762	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) **SEPTEMBER**

Tank No.	SA						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.82**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**4.00**	lb/month	Vapor Space Volume	Vv	536.2	ft3
		2.00E-03	ton/month	Stock Vapor Density	Wv	0.0023	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.18**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0023	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	0.1210	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**6.28**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0501**	**per day**
Diameter	D	**14.74**	ft	Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Throughput	Q	**7,200**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.92**	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	0.1210	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	527.18	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**5.28**	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	**3.14**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**28.59**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**26.66**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	534.32	°R
Not Insulated	P_{VA}	0.12100742		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated	P_{VA}	0.12193693					
Fully Insulated	P_{VA}	0.10975059		**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 usin	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°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**	**536.17**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°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**	**527.40**	°R	Effective Tank Height	H_E	6.28	ft
Fully Insulated: TLA = TB	**TLA**	**524.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.261E-03					
Partially Insulated	Wv	2.274E-03					
Fully Insulated	Wv	2.071E-03					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**3.997**
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)**	**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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	1.0191	0.4643	0.5548	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	2.9779	1.3568	1.6212	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	SA		
Total Losses (Eq.1-1: LT = LS+LW)	LT	2.35	lb/month
		1.17E-03	ton/month
Time Period		October	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	882.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.74	ft
Throughput	Q	7,200	gal/month
Turnovers	N	10.57	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.0742607	
Partially Insulated	P_{VA}	0.07467428	
Fully Insulated	P_{VA}	0.06919088	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	509.75	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.23	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.38	°R
Fully Insulated: TLA = TB	TLA	511.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.81	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.48	°R
Fully Insulated; Tv = TB	Tv	511.28	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.427E-03	
Partially Insulated	Wv	1.433E-03	
Fully Insulated	Wv	1.339E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.97	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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	1.37	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0743	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0410	per day
Average Daily Vapor Temperature Range	ΔTv	23.18	°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	0.0743	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	23.18	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	21.33	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	536.17	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	2.347
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	Standing, lb/yr	Working, lb/yr	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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.6001	0.2488	0.3512	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	1.7465	0.7243	1.0223	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	SA		
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.38	lb/month
		6.88E-04	ton/month
Time Period		November	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	534.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.74	ft
Throughput	Q	7,200	gal/month
Turnovers	N	10.92	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.04871392	
Partially Insulated	P_{VA}	0.04888755	
Fully Insulated	P_{VA}	0.04656051	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	499.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	501.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	502.00	°R
Fully Insulated: TLA = TB	TLA	500.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.87	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	503.27	°R
Fully Insulated; Tv = TB	Tv	500.73	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.584E-04	
Partially Insulated	Wv	9.611E-04	
Fully Insulated	Wv	9.200E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.45	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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	0.92	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0487	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0294	per day
Average Daily Vapor Temperature Range	ΔTv	16.83	°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	0.0487	psia
Average Daily Liquid Surface Temperature	TLA	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.83	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.31	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	536.17	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	1.376
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	Standing, lb/yr	Working, lb/yr	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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.3526	0.1162	0.2364	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	1.0231	0.3371	0.6860	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	SA		
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.86	lb/month
		4.32E-04	ton/month
Time Period		December	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	422.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	14.74	ft
Throughput	Q	7,200	gal/month
Turnovers	N	10.57	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.03108539	
Partially Insulated	P_{VA}	0.03117819	
Fully Insulated	P_{VA}	0.02993067	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	488.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	490.51	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	490.59	°R
Fully Insulated: TLA = TB	TLA	489.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	491.27	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	491.59	°R
Fully Insulated; Tv = TB	Tv	489.58	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.260E-04	
Partially Insulated	Wv	6.275E-04	
Fully Insulated	Wv	6.049E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.26	lb/month
Vapor Space Volume	Vv	536.2	ft3
Stock Vapor Density	Wv	0.0006	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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	0.60	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	962	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	0.0006	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	0.0311	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0251	per day
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0311	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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	14.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	13.00	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	536.17	ft3
Effective Tank diameter	D_E	14.74	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.864
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	Standing, lb/yr	Working, lb/yr	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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.2219	0.0671	0.1548	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.6419	0.1942	0.4477	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	A-Red Dye	Tank type	
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	1.03	lb/year
		0.00	ton/year
Time Period		Annual	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1180.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	2.49	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	4.49	ft
Throughput	Q	2,976	gal/yr
Turnovers	N	10.10	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	2.49	ft
Minimum Filling Height (use 0 if unknown)	HLN	0.00	ft
Liquid height (assume 1/2 H_E)	HL	1.24	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.0732593	
Partially Insulated	P_{VA}	0.0738066	
Fully Insulated	P_{VA}	0.0666245	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	508.20	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	512.85	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.06	°R
Fully Insulated: TLA = TB	TLA	510.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.98	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.87	°R
Fully Insulated; Tv = TB	Tv	510.25	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.47	lb/yr
Vapor Space Volume	Vv	19.7	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	Lw	0.56	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	398	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0468	per day
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	26.15	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	24.37	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	19.69	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/yr	Vapor Weight Concentrations			Vapor Mole Fraction		
Product	additive						
Total HAP Emissions =	1.034						
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	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	0.2643	106.17	106	0.25574	0.018735	0.073	**0.25574**
xylenes	0.7693	106.17	106	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.03**	lb/month
		1.32E-05	ton/month
Time Period		**January**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**2.49**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**248**	gal/month
Turnovers	N	**9.91**	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	**1.49**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.24**	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)		**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}	0.0251317	
Partially Insulated	P_{VA}	0.0252289	
Fully Insulated	P_{VA}	0.0239284	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R
Fully Insulated: TLA = TB	**TLA**	**484.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.113E-04	
Partially Insulated	Wv	5.129E-04	
Fully Insulated	Wv	4.890E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	19.7	ft3
Stock Vapor Density	Wv	0.0005	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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**	**0.02**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0005	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	0.0251	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0301**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0251	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.60**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.11**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**19.69**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.026
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	Standing, lb/yr	Working, lb/yr	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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.0068	0.0024	0.0044	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.0196	0.0070	0.0126	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.03**	lb/month
		1.58E-05	ton/month
Time Period		**February**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**2.49**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**248**	gal/month
Turnovers	N	**10.97**	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	**1.49**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.24**	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)		**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}	0.0291193	
Partially Insulated	P_{VA}	0.0292833	
Fully Insulated	P_{VA}	0.0271094	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R
Fully Insulated: TLA = TB	**TLA**	**487.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.876E-04	
Partially Insulated	Wv	5.902E-04	
Fully Insulated	Wv	5.506E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	19.7	ft3
Stock Vapor Density	Wv	0.0006	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	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.02**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0006	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	0.0291	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0375**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.35	°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	0.0291	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.75**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**19.69**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.032
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	Standing, lb/yr	Working, lb/yr	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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.0081	0.0031	0.0050	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.0235	0.0090	0.0145	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.05**	lb/month
		2.64E-05	ton/month
Time Period		**March**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**2.49**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**248**	gal/month
Turnovers	N	**9.91**	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	**1.49**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.24**	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)		**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}	0.0437548	
Partially Insulated	P_{VA}	0.04408	
Fully Insulated	P_{VA}	0.0398128	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R
Fully Insulated: TLA = TB	**TLA**	**496.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.639E-04	
Partially Insulated	Wv	8.689E-04	
Fully Insulated	Wv	7.930E-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	19.7	ft3
Stock Vapor Density	Wv	0.0009	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**	**0.03**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0438	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0457**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.89	°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	0.0438	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.15**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**19.69**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.053
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	Standing, lb/yr	Working, lb/yr	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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.0135	0.0062	0.0073	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	0.0392	0.0179	0.0213	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.10**	lb/month
		4.78E-05	ton/month
Time Period		**April**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**2.49**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**248**	gal/month
Turnovers	N	**10.24**	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	**1.49**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.24**	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)		**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}	0.0745883	
Partially Insulated	P_{VA}	0.0752936	
Fully Insulated	P_{VA}	0.0661361	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R
Fully Insulated: TLA = TB	**TLA**	**510.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-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	19.7	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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	33	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0571**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.42**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.41**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**19.69**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.096
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)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.0244	0.0123	0.0121	106.17	106	0.25571	0.019073	0.075	**0.25571**
xylenes	0.0712	0.0359	0.0353	106.17	106	0.74429	0.055515	0.075	**0.74429**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.15**	lb/month
		7.43E-05	ton/month
Time Period		**May**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**2.49**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**248**	gal/month
Turnovers	N	**9.91**	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	**1.49**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.24**	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)		**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}	0.1114435	
Partially Insulated	P_{VA}	0.1126033	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R
Fully Insulated: TLA = TB	**TLA**	**520.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.08**	lb/month
Vapor Space Volume	Vv	19.7	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**0.07**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0623**	**per day**
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**34.87**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**32.77**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**19.69**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.149
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)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	0.0379	0.0203	0.0177	106.17	106	0.25510	0.028429	0.111	**0.25510**
xylenes	0.1107	0.0592	0.0516	106.17	106	0.74490	0.083014	0.111	**0.74490**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	**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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.20**	lb/month
		9.97E-05	ton/month
Time Period		**June**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Diesel Additive**	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**2.49**	ft
Diameter	D	**4.49**	ft
Throughput	Q	**248**	gal/month
Turnovers	N	**10.24**	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	**1.49**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.24**	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)		**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}	0.1556972	
Partially Insulated	P_{VA}	0.1573442	
Fully Insulated	P_{VA}	0.1360798	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R
Fully Insulated: TLA = TB	**TLA**	**530.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-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	19.7	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	33	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0618**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.28**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**19.69**	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.199
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)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	0.0508	0.0266	0.0242	106.17	106	0.25456	0.039634	0.156	**0.25456**
xylenes	0.1487	0.0779	0.0707	106.17	106	0.74544	0.116064	0.156	**0.74544**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	**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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	A-Red Dye		
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		July	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1872.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	2.49	ft
Diameter	D	4.49	ft
Throughput	Q	248	gal/month
Turnovers	N	9.91	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	1.49	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.24	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)		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}	0.1770708	
Partially Insulated	P_{VA}	0.1789285	
Fully Insulated	P_{VA}	0.1549312	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	531.35	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	538.73	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	539.06	°R
Fully Insulated: TLA = TB	TLA	534.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	542.10	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	543.51	°R
Fully Insulated; Tv = TB	Tv	534.61	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.232E-03	
Partially Insulated	Wv	3.257E-03	
Fully Insulated	Wv	2.867E-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	19.7	ft3
Stock Vapor Density	Wv	0.0032	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	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	33	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	0.1771	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0612	per day
Average Daily Vapor Temperature Range	ΔTv	35.23	°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	0.1771	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.23	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.30	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	19.69	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.228
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	0.0580	0.0307	0.0272	106.17	106	0.25434	0.045036	0.177	0.25434
xylenes	0.1699	0.0900	0.0799	106.17	106	0.74566	0.132035	0.177	0.74566
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.20	lb/month
		1.02E-04	ton/month
Time Period		August	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1640.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	2.49	ft
Diameter	D	4.49	ft
Throughput	Q	248	gal/month
Turnovers	N	9.91	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	1.49	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.24	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)		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}	0.1654054	
Partially Insulated	P_{VA}	0.1669398	
Fully Insulated	P_{VA}	0.1469906	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	530.15	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	536.62	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	536.90	°R
Fully Insulated: TLA = TB	TLA	533.0	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	539.57	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	540.80	°R
Fully Insulated; Tv = TB	Tv	533.00	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.033E-03	
Partially Insulated	Wv	3.054E-03	
Fully Insulated	Wv	2.728E-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	19.7	ft3
Stock Vapor Density	Wv	0.0030	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	0.10	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.1654	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	32.39	°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	0.1654	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	32.39	°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	0.00000	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	19.69	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.205
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	0.0521	0.0265	0.0256	106.17	106	0.25445	0.042088	0.165	0.25445
xylenes	0.1525	0.0776	0.0750	106.17	106	0.74555	0.123317	0.165	0.74555
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-Red Dye		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.14	lb/month
		7.09E-05	ton/month
Time Period		September	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1300.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	2.49	ft
Diameter	D	4.49	ft
Throughput	Q	248	gal/month
Turnovers	N	10.24	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	1.49	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.24	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)		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}	0.1210074	
Partially Insulated	P_{VA}	0.1219369	
Fully Insulated	P_{VA}	0.1097506	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	522.05	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	527.18	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	527.40	°R
Fully Insulated: TLA = TB	TLA	524.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	529.51	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	530.49	°R
Fully Insulated; Tv = TB	Tv	524.31	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-03	
Partially Insulated	Wv	2.274E-03	
Fully Insulated	Wv	2.071E-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	19.7	ft3
Stock Vapor Density	Wv	0.0023	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	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	33	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	0.0023	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	0.1210	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0501	per day
Average Daily Vapor Temperature Range	ΔTv	28.59	°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	0.1210	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	28.59	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	26.66	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	19.69	ft3
Effective Tank diameter	D_E	4.49	ft
Effective Tank Height	H_E	2.49	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.142
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	0.0362	0.0171	0.0191	106.17	106	0.25497	0.030853	0.121	0.25497
xylenes	0.1057	0.0498	0.0558	106.17	106	0.74503	0.090154	0.121	0.74503
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) **OCTOBER**

Tank No. **A-Red Dye**

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.04**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.08**	lb/month	Vapor Space Volume	Vv	19.7	ft3
		4.15E-05	ton/month	Stock Vapor Density	Wv	0.0014	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.05**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.0743	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**2.49**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0410**	**per day**
Diameter	D	**4.49**	ft	Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Throughput	Q	**248**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**9.91**	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	0.0743	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.23	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**1.49**	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	**1.24**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**23.18**	°R
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**21.33**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	519.02	°R
Not Insulated	P_{VA}	0.0742607		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated	P_{VA}	0.0746743					
Fully Insulated	P_{VA}	0.0691909		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	508.05	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°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**	**19.69**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R	Effective Tank diameter	D_E	4.49	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R	Effective Tank Height	H_E	2.49	ft
Fully Insulated: TLA = TB	**TLA**	**511.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.427E-03					
Partially Insulated	Wv	1.433E-03					
Fully Insulated	Wv	1.339E-03					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.083
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)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.0212	0.0091	0.0121	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	0.0618	0.0266	0.0352	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) **NOVEMBER**

Tank No. **A-Red Dye**

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.02**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.05**	lb/month	Vapor Space Volume	Vv	19.7	ft3
		2.42E-05	ton/month	Stock Vapor Density	Wv	0.0010	lb/ft3
Time Period		**November**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.03**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.0487	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**2.49**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0294**	**per day**
Diameter	D	**4.49**	ft	Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Throughput	Q	**248**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**10.24**	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	0.0487	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	501.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**1.49**	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	**1.24**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.83**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.31**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	506.11	°R
Not Insulated	P_{VA}	0.0487139		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated	P_{VA}	0.0488875					
Fully Insulated	P_{VA}	0.0465605		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	498.17	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°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**	**19.69**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R	Effective Tank diameter	D_E	4.49	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R	Effective Tank Height	H_E	2.49	ft
Fully Insulated: TLA = TB	**TLA**	**500.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	9.584E-04					
Partially Insulated	Wv	9.611E-04					
Fully Insulated	Wv	9.200E-04					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.048
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)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.0124	0.0043	0.0081	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	0.0360	0.0124	0.0236	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) **DECEMBER**

Tank No. **A-Red Dye**

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.03**	lb/month	Vapor Space Volume	Vv	19.7	ft3
		1.52E-05	ton/month	Stock Vapor Density	Wv	0.0006	lb/ft3
Time Period		**December**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.02**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0006	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	0.0311	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**2.49**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0251**	**per day**
Diameter	D	**4.49**	ft	Average Daily Vapor Temperature Range	ΔTv	14.35	°R
Throughput	Q	**248**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**9.91**	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	0.0311	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	490.51	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**1.49**	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	**1.24**	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**	**14.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**13.00**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	494.10	°R
Not Insulated	P_{VA}	0.0310854		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated	P_{VA}	0.0311782					
Fully Insulated	P_{VA}	0.0299307		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	487.34	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°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**	**19.69**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R	Effective Tank diameter	D_E	4.49	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R	Effective Tank Height	H_E	2.49	ft
Fully Insulated: TLA = TB	**TLA**	**489.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.24	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	6.260E-04					
Partially Insulated	Wv	6.275E-04					
Fully Insulated	Wv	6.049E-04					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	0.030
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)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.0078	0.0025	0.0053	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.0226	0.0071	0.0154	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	A-Red Dye 2	Tank type	
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.32**	lb/year
		0.00	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	**106**	Lb/lb-mole
Average organic liquid density	WL	**6.10**	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	**5.92**	ft
Throughput	Q	**5,400**	gal/yr
Turnovers	N	**6.68**	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.0732593	
Partially Insulated	P_{VA}	0.0738066	
Fully Insulated	P_{VA}	0.0666245	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**1.30**	lb/yr
Vapor Space Volume	Vv	54.0	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.02**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	722	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0468**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**54.00**	ft3
Effective Tank diameter	D_E	5.92	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 =	**2.315**	**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	106	0.00000	0.000000	0.073	-
benzene	0.0000	78.11	106	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106	0.00000	0.000000	0.073	-
ethylbenzene	0.5921	106.17	106	0.25574	0.018735	0.073	**0.25574**
xylenes	1.7231	106.17	106	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	A-Red Dye 2						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.06**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		2.82E-05	ton/month	Stock Vapor Density	Wv	0.0005	lb/ft3
Time Period		**January**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.03**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0005	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	0.0251	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0301**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	16.60	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.56**	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	0.0251	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	485.35	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.60**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.11**	°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	**0.00000**	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[A	PVX	1.00000	psia
	PBV	**-0.03**		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	489.50	°R
Not Insulated	P_{VA}	0.0251317		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°R
Partially Insulated	P_{VA}	0.0252289					
Fully Insulated	P_{VA}	0.0239284		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	481.66	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**484.2**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	5.113E-04					
Partially Insulated	Wv	5.129E-04					
Fully Insulated	Wv	4.890E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.056**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**Standing, lb/yr**	**Working, lb/yr**	**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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.0145	0.0066	0.0079	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.0420	0.0191	0.0228	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	A-Red Dye 2						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.07**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		3.43E-05	ton/month	Stock Vapor Density	Wv	0.0006	lb/ft3
Time Period		**February**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.037	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	28	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.04**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0006	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	0.0291	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0375**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	20.35	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**7.26**	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	0.0291	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	488.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**20.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**18.75**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	494.00	°R
Not Insulated	P_{VA}	0.0291193		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°R
Partially Insulated	P_{VA}	0.0292833					
Fully Insulated	P_{VA}	0.0271094		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	484.36	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**487.2**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	5.876E-04					
Partially Insulated	Wv	5.902E-04					
Fully Insulated	Wv	5.506E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.069**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**Standing, lb/yr**	**Working, lb/yr**	**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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.0176	0.0086	0.0091	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.0510	0.0247	0.0263	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	A-Red Dye 2						
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**	**0.12**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		5.91E-05	ton/month	Stock Vapor Density	Wv	0.0009	lb/ft3
Time Period		**March**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.05**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0009	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	0.0438	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0457**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	24.89	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.56**	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	0.0438	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	499.12	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**24.89**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**23.15**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	505.35	°R
Not Insulated	P_{VA}	0.0437548		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°R
Partially Insulated	P_{VA}	0.04408					
Fully Insulated	P_{VA}	0.0398128		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	493.52	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**496.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	8.639E-04					
Partially Insulated	Wv	8.689E-04					
Fully Insulated	Wv	7.930E-04					

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.118**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**Standing, lb/yr**	**Working, lb/yr**	**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	0.0000	0.0000	86.18	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.0303	0.0170	0.0133	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	0.0878	0.0492	0.0386	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) — APRIL

Tank No.	A-Red Dye 2		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.22	lb/month
		1.09E-04	ton/month
Time Period		April	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1496.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	5.92	ft
Throughput	Q	450	gal/month
Turnovers	N	6.78	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)		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}	0.0745883	
Partially Insulated	P_{VA}	0.0752936	
Fully Insulated	P_{VA}	0.0661361	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.61	°R
Fully Insulated: TLA = TB	TLA	510.1	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	516.04	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	517.17	°R
Fully Insulated; Tv = TB	Tv	510.05	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.13	lb/month
Vapor Space Volume	Vv	54.0	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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	60	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0571	per day
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	31.42	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	29.41	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	54.00	ft3
Effective Tank diameter	D_E	5.92	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 =	0.218

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)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.0558	0.0338	0.0220	106.17	106	0.25571	0.019073	0.075	0.25571
xylenes	0.1624	0.0984	0.0640	106.17	106	0.74429	0.055515	0.075	0.74429
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) — MAY

Tank No.	A-Red Dye 2		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.34	lb/month
		1.72E-04	ton/month
Time Period		May	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1739.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	5.92	ft
Throughput	Q	450	gal/month
Turnovers	N	6.56	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	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)		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}	0.1114435	
Partially Insulated	P_{VA}	0.1126033	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	517.90	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	524.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	525.06	°R
Fully Insulated: TLA = TB	TLA	520.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	527.89	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	529.20	°R
Fully Insulated; Tv = TB	Tv	520.93	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.22	lb/month
Vapor Space Volume	Vv	54.0	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	60	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0623	per day
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	34.87	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	32.77	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	54.00	ft3
Effective Tank diameter	D_E	5.92	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 =	0.343

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)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	0.0876	0.0556	0.0320	106.17	106	0.25510	0.028429	0.111	0.25510
xylenes	0.2558	0.1622	0.0936	106.17	106	0.74490	0.083014	0.111	0.74490
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) — JUNE

Tank No.	A-Red Dye 2		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.46	lb/month
		2.29E-04	ton/month
Time Period		June	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1853.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Diesel Additive	
Vapor Molecular weight	Mv	106	Lb/lb-mole
Average organic liquid density	WL	6.10	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	5.92	ft
Throughput	Q	450	gal/month
Turnovers	N	6.78	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)		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}	0.1556972	
Partially Insulated	P_{VA}	0.1573442	
Fully Insulated	P_{VA}	0.1360798	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	527.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	534.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	535.08	°R
Fully Insulated: TLA = TB	TLA	530.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	538.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	539.49	°R
Fully Insulated; Tv = TB	Tv	530.67	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.29	lb/month
Vapor Space Volume	Vv	54.0	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	0.17	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0618	per day
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.28	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.31	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 using	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	54.00	ft3
Effective Tank diameter	D_E	5.92	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 =	0.459

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)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	0.1168	0.0730	0.0438	106.17	106	0.25456	0.039634	0.156	0.25456
xylenes	0.3420	0.2137	0.1284	106.17	106	0.74544	0.116064	0.156	0.74544
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	A-Red Dye 2						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.33**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.53**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		2.63E-04	ton/month	Stock Vapor Density	Wv	0.0032	lb/ft3
Time Period		**July**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.061	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses**; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.19**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0032	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	0.1771	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0612**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.56**	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	0.1771	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	538.73	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.23**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.30**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	547.54	°R
Not Insulated	P_{VA}	0.1770708		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated	P_{VA}	0.1789285					
Fully Insulated	P_{VA}	0.1549312		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	530.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**534.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.232E-03					
Partially Insulated	Wv	3.257E-03					
Fully Insulated	Wv	2.867E-03					

HAPS Speciation	**lb/month**								
Product	additive								
Total HAP Emissions =	**0.526**			**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)**	**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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	0.1337	0.0842	0.0494	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	0.3918	0.2469	0.1449	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	A-Red Dye 2						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.29**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.47**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		2.34E-04	ton/month	Stock Vapor Density	Wv	0.0030	lb/ft3
Time Period		**August**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.056	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	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	60	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.1654	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0562**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.56**	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	0.1654	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	536.62	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**32.39**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**30.48**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	544.72	°R
Not Insulated	P_{VA}	0.1654054		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated	P_{VA}	0.1669398					
Fully Insulated	P_{VA}	0.1469906		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	529.28	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**533.0**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	3.033E-03					
Partially Insulated	Wv	3.054E-03					
Fully Insulated	Wv	2.728E-03					

HAPS Speciation	**lb/month**								
Product	additive								
Total HAP Emissions =	**0.468**			**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)**	**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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	0.1190	0.0726	0.0464	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	0.3487	0.2127	0.1360	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	A-Red Dye 2						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.18**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.32**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		1.60E-04	ton/month	Stock Vapor Density	Wv	0.0023	lb/ft3
Time Period		**September**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.050	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses**; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.14**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0023	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	0.1210	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0501**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.78**	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	0.1210	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	527.18	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**28.59**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**26.66**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	534.32	°R
Not Insulated	P_{VA}	0.1210074		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated	P_{VA}	0.1219369					
Fully Insulated	P_{VA}	0.1097506		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	520.74	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**524.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.261E-03					
Partially Insulated	Wv	2.274E-03					
Fully Insulated	Wv	2.071E-03					

HAPS Speciation	**lb/month**								
Product	additive								
Total HAP Emissions =	**0.319**			**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)**	**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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	0.0814	0.0468	0.0347	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	0.2380	0.1366	0.1013	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.		A-Red Dye 2					
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.10**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.18**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		9.19E-05	ton/month	Stock Vapor Density	Wv	0.0014	lb/ft3
Time Period		**October**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.09**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.0743	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0410**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.56**	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	0.0743	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.23	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**23.18**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**21.33**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	519.02	°R
Not Insulated	P_{VA}	0.0742607		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated	P_{VA}	0.0746743					
Fully Insulated	P_{VA}	0.0691909		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	508.05	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**511.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.427E-03					
Partially Insulated	Wv	1.433E-03					
Fully Insulated	Wv	1.339E-03					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.184**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.0470	0.0251	0.0220	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	0.1368	0.0729	0.0639	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**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	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.		A-Red Dye 2					
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.05**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.10**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		5.17E-05	ton/month	Stock Vapor Density	Wv	0.0010	lb/ft3
Time Period		**November**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.06**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	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	0.0487	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0294**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.78**	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	0.0487	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	501.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.83**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.31**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	506.11	°R
Not Insulated	P_{VA}	0.0487139		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated	P_{VA}	0.0488875					
Fully Insulated	P_{VA}	0.0465605		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	498.17	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**500.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	9.584E-04					
Partially Insulated	Wv	9.611E-04					
Fully Insulated	Wv	9.200E-04					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.103**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.0265	0.0117	0.0148	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	0.0768	0.0339	0.0429	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**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	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.		A-Red Dye 2					
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.03**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.06**	lb/month	Vapor Space Volume	Vv	54.0	ft3
		3.20E-05	ton/month	Stock Vapor Density	Wv	0.0006	lb/ft3
Time Period		**December**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.04**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	60	ft3/month
Product Type		**Diesel 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	**6.10**	lb/gal	Stock Vapor Density	Wv	0.0006	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	0.0311	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.93**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0251**	**per day**
Diameter	D	**5.92**	ft	Average Daily Vapor Temperature Range	ΔTv	14.35	°R
Throughput	Q	**450**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0000	psi
Turnovers	N	**6.56**	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	0.0311	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	490.51	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.93**	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	**1.96**	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**	**14.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**13.00**	°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	**0.00000**	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[A	PVX	1.00000	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	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	494.10	°R
Not Insulated	P_{VA}	0.0310854		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated	P_{VA}	0.0311782					
Fully Insulated	P_{VA}	0.0299307		**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 using	PVX	1.00000	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	487.34	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°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**	**54.00**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R	Effective Tank diameter	D_E	5.92	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R	Effective Tank Height	H_E	3.93	ft
Fully Insulated: TLA = TB	**TLA**	**489.6**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.96	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	6.260E-04					
Partially Insulated	Wv	6.275E-04					
Fully Insulated	Wv	6.049E-04					

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.064**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.0164	0.0068	0.0097	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.0475	0.0196	0.0280	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**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	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	WHFO	Tank type	Horizontal Fixed Roof Tank
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.08**	lb/year
		0.00	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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			
Effective Height H_E = (Pi)D/4	H_E	**3.14**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**3.71**	ft
Throughput	Q	**3,000**	gal/yr
Turnovers	N	**11.82**	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	**3.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		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}	0.00516155	
Partially Insulated	P_{VA}	0.00519755	
Fully Insulated	P_{VA}	0.00472428	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.214E-04	
Partially Insulated	Wv	1.221E-04	
Fully Insulated	Wv	1.122E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.04**	lb/yr
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.05**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	401	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0470**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00230**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00642	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00412	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	0.00637	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0042189	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/yr**						
Product	Diesel						
Total HAP Emissions =	**0.007**	**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	130	0.00045	0.000003	0.005	**0.00067**
benzene	0.0002	78.11	130	0.00217	0.000019	0.005	**0.00360**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	-
toluene	0.0020	92.14	130	0.02394	0.000174	0.005	**0.03377**
ethylbenzene	0.0002	106.17	130	0.00297	0.000019	0.005	**0.00363**
xylenes	0.0048	106.17	130	0.05753	0.000364	0.005	**0.07045**
naphthalene	0.0000	128.17	130	3.69E-04	1.93E-06	0.005	**3.74E-04**
cumene	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	**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	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.5971
benzene	0.0000080	188	78.11	0.00002	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	188	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0003200	188	92.14	0.00065	7.017	1377.6	222.64	0.2670
ethylbenzene	0.0001300	188	106.17	0.00023	6.95	1419.3	212.61	0.0815
xylenes	0.0029000	188	106.17	0.00514	7.009	1462.3	215.11	0.0708
naphthalene	0.0007565	188	128.17	0.00111	7.146	1831.6	211.82	0.0017
cumene	0.0000000	188	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	0.00	lb/month
		1.18E-06	ton/month
Time Period		**January**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.57**	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)		**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}	0.00192896	
Partially Insulated	P_{VA}	0.00193573	
Fully Insulated	P_{VA}	0.00184511	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R
Fully Insulated: TLA = TB	**TLA**	**484.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.805E-05	
Partially Insulated	Wv	4.818E-05	
Fully Insulated	Wv	4.617E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0000	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	0.0019	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0301**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0019	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.60**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.11**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00061**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00225	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00165	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00055**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00223	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0016763	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.000**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**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	130	0.00054	0.000002	0.002	**0.00082**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00249	0.000008	0.002	**0.00415**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	**-**
toluene	0.0001	0.0000	0.0000	92.14	130	0.02493	0.000068	0.002	**0.03517**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00274	0.000006	0.002	**0.00335**
xylenes	0.0001	0.0000	0.0001	106.17	130	0.05271	0.000125	0.002	**0.06455**
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.47E-04	4.84E-07	0.002	**2.51E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	**0.00E+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	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.7246
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1039
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0281
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0242
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0004
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	0.00	lb/month
		1.40E-06	ton/month
Time Period		**February**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**12.84**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.57**	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)		**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}	0.00220504	
Partially Insulated	P_{VA}	0.00221635	
Fully Insulated	P_{VA}	0.00206621	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R
Fully Insulated: TLA = TB	**TLA**	**487.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.448E-05	
Partially Insulated	Wv	5.469E-05	
Fully Insulated	Wv	5.138E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	17.0	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**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0022	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0376**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.35	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	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	0.0022	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.75**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00084**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00266	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00182	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00078**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00263	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0018581	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.000**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**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	130	0.00053	0.000002	0.002	**0.00080**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00245	0.000009	0.002	**0.00408**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	**-**
toluene	0.0001	0.0000	0.0000	92.14	130	0.02482	0.000077	0.002	**0.03503**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00277	0.000007	0.002	**0.00340**
xylenes	0.0001	0.0001	0.0001	106.17	130	0.05344	0.000144	0.002	**0.06544**
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.62E-04	5.86E-07	0.002	**2.66E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	**0.00E+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	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	0.8076
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1183
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0325
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0281
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0005
naphthalene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	0.00	lb/month
		2.23E-06	ton/month
Time Period		**March**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.57**	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)		**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}	0.00320093	
Partially Insulated	P_{VA}	0.00322282	
Fully Insulated	P_{VA}	0.00293485	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R
Fully Insulated: TLA = TB	**TLA**	**496.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.739E-05	
Partially Insulated	Wv	7.779E-05	
Fully Insulated	Wv	7.158E-05	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	17.0	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**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.00	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	24.89	°R
Average Daily Vapor Pressure Range	ΔPv	0.0014	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	0.0032	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.15**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00143**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00399	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00256	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00134**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00395	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0026144	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.000**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	**L_{Ti} (lb/month)**	**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	130	0.00049	0.000002	0.003	**0.00074**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00233	0.000012	0.003	**0.00387**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.0001	0.0000	0.0001	92.14	130	0.02448	0.000111	0.003	**0.03454**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00287	0.000011	0.003	**0.00351**
xylenes	0.0002	0.0001	0.0001	106.17	130	0.05536	0.000217	0.003	**0.06778**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.05E-04	9.92E-07	0.003	**3.10E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.003	**0.00E+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	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	1.0907
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1694
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0488
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0423
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		3.85E-06	ton/month
Time Period		**April**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.98**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.57**	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)		**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}	0.00524895	
Partially Insulated	P_{VA}	0.00529531	
Fully Insulated	P_{VA}	0.00469203	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R
Fully Insulated: TLA = TB	**TLA**	**510.1**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.232E-04	
Partially Insulated	Wv	1.240E-04	
Fully Insulated	Wv	1.114E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0573**	**per day**
Average Daily Vapor Temperature Range	ΔTv	31.42	°R
Average Daily Vapor Pressure Range	ΔPv	0.0028	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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**31.42**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**29.41**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00281**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00682	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00401	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00265**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00676	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0041162	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**

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)**	**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	130	0.00045	0.000004	0.005	**0.00067**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00216	0.000019	0.005	**0.00360**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.0002	0.0001	0.0001	92.14	130	0.02392	0.000177	0.005	**0.03374**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00297	0.000019	0.005	**0.00364**
xylenes	0.0004	0.0002	0.0002	106.17	130	0.05761	0.000370	0.005	**0.07053**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.71E-04	1.98E-06	0.005	**3.76E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	**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	188	86.18	0.00000	6.878	1171.5	224.37	1.6185
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2713
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0829
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0721
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		5.83E-06	ton/month
Time Period		**May**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.57**	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)		**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}	0.00765407	
Partially Insulated	P_{VA}	0.0077293	
Fully Insulated	P_{VA}	0.00675547	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R
Fully Insulated: TLA = TB	**TLA**	**520.9**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.757E-04	
Partially Insulated	Wv	1.769E-04	
Fully Insulated	Wv	1.571E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.063	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0077	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0626**	**per day**
Average Daily Vapor Temperature Range	ΔTv	34.87	°R
Average Daily Vapor Pressure Range	ΔPv	0.0044	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	0.0077	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**34.87**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**32.77**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00435**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01010	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00575	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00412**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01003	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0059069	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**

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)**	**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	130	0.00041	0.000005	0.008	**0.00062**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00203	0.000026	0.008	**0.00339**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.008	**-**
toluene	0.0003	0.0001	0.0001	92.14	130	0.02340	0.000253	0.008	**0.03301**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00304	0.000028	0.008	**0.00372**
xylenes	0.0007	0.0003	0.0003	106.17	130	0.05907	0.000554	0.008	**0.07233**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.28E-04	3.32E-06	0.008	**4.34E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.008	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.1802
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3870
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1236
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1078
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0030
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month
		7.70E-06	ton/month
Time Period		**June**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.98**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**1.57**	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)		**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}	0.01051319	
Partially Insulated	P_{VA}	0.01061923	
Fully Insulated	P_{VA}	0.00924836	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R
Fully Insulated: TLA = TB	**TLA**	**530.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.367E-04	
Partially Insulated	Wv	2.385E-04	
Fully Insulated	Wv	2.111E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0105	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0623**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.28	°R
Average Daily Vapor Pressure Range	ΔPv	0.0058	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	0.0105	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.28**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.31**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00583**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01378	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00795	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00554**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01371	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0081618	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**

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)**	**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	130	0.00038	0.000006	0.011	**0.00058**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00193	0.000034	0.011	**0.00321**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.0004	0.0002	0.0002	92.14	130	0.02292	0.000340	0.011	**0.03233**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00308	0.000040	0.011	**0.00377**
xylenes	0.0009	0.0005	0.0005	106.17	130	0.06013	0.000774	0.011	**0.07362**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.79E-04	5.11E-06	0.011	**4.86E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.7955
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5206
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1723
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1507
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0046
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month
		8.75E-06	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.01188794	
Partially Insulated	P_{VA}	0.01200729	
Fully Insulated	P_{VA}	0.01046386	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.657E-04	
Partially Insulated	Wv	2.676E-04	
Fully Insulated	Wv	2.371E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0119	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0617**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	0.0065	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	0.0119	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00648**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01551	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00903	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00617**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01544	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0092662	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	**0.002**

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)	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	130	0.00037	0.000007	0.012	**0.00056**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00189	0.000037	0.012	**0.00315**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.012	-
toluene	0.0004	0.0002	0.0002	92.14	130	0.02272	0.000381	0.012	**0.03205**
ethylbenzene	0.0001	0.0000	0.0000	106.17	130	0.00310	0.000045	0.012	**0.00379**
xylenes	0.0011	0.0005	0.0005	106.17	130	0.06049	0.000881	0.012	**0.07407**
naphthalene	0.0000	0.0000	0.0000	128.17	130	5.01E-04	6.04E-06	0.012	**5.08E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.012	**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	188	86.18	0.00000	6.878	1171.5	224.37	3.0764
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5836
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1958
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1715
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0054
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month
		7.90E-06	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.01113798	
Partially Insulated	P_{VA}	0.01123667	
Fully Insulated	P_{VA}	0.00995225	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.501E-04	
Partially Insulated	Wv	2.517E-04	
Fully Insulated	Wv	2.262E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0111	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0566**	**per day**
Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	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	0.0111	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	**°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	**0.00562**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01426	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00864	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00532**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01417	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0088491	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	**0.001**

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)	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	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00191	0.000035	0.011	**0.00318**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	-
toluene	0.0004	0.0002	0.0002	92.14	130	0.02282	0.000359	0.011	**0.03220**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00309	0.000042	0.011	**0.00378**
xylenes	0.0010	0.0004	0.0005	106.17	130	0.06030	0.000822	0.011	**0.07384**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.89E-04	5.53E-06	0.011	**4.96E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.9242
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5493
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1830
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1602
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0050
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		5.59E-06	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.98**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.00827392	
Partially Insulated	P_{VA}	0.00833409	
Fully Insulated	P_{VA}	0.0075442	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.893E-04	
Partially Insulated	Wv	1.903E-04	
Fully Insulated	Wv	1.743E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0002	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0083	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0504**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Average Daily Vapor Pressure Range	ΔPv	0.0038	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	0.0083	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00381**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01037	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00656	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00358**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01029	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0067140	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	**0.001**

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)	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	130	0.00041	0.000005	0.008	**0.00061**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00201	0.000028	0.008	**0.00334**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.008	-
toluene	0.0003	0.0001	0.0001	92.14	130	0.02329	0.000272	0.008	**0.03285**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00305	0.000031	0.008	**0.00373**
xylenes	0.0007	0.0003	0.0004	106.17	130	0.05935	0.000601	0.008	**0.07267**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.40E-04	3.69E-06	0.008	**4.46E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.008	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.3177
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4163
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1341
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1171
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0033
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) — OCTOBER

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.01	lb/month
		3.39E-06	ton/month
Time Period		October	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	882.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	3.71	ft
Throughput	Q	250	gal/month
Turnovers	N	11.60	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.00522741	
Partially Insulated	P_{VA}	0.0052546	
Fully Insulated	P_{VA}	0.00489362	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	509.75	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.23	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.38	°R
Fully Insulated: TLA = TB	TLA	511.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.81	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.48	°R
Fully Insulated; Tv = TB	Tv	511.28	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.230E-04	
Partially Insulated	Wv	1.235E-04	
Fully Insulated	Wv	1.159E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0412	per day
Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Average Daily Vapor Pressure Range	ΔPv	0.0021	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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	23.18	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	21.33	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00206	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00635	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00429	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00190	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00628	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0043797	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	16.96	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.001

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)	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	130	0.00045	0.000004	0.005	0.00067
benzene	0.0000	0.0000	0.0000	78.11	130	0.00216	0.000019	0.005	0.00360
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.005	-
toluene	0.0002	0.0001	0.0001	92.14	130	0.02392	0.000176	0.005	0.03375
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00297	0.000019	0.005	0.00364
xylenes	0.0004	0.0002	0.0002	106.17	130	0.05759	0.000369	0.005	0.07051
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.71E-04	1.97E-06	0.005	3.76E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	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	188	86.18	0.00000	6.878	1171.5	224.37	1.6132
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2702
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0826
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0718
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) — NOVEMBER

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		2.06E-06	ton/month
Time Period		November	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	534.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	3.71	ft
Throughput	Q	250	gal/month
Turnovers	N	11.98	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.00353392	
Partially Insulated	P_{VA}	0.00354555	
Fully Insulated	P_{VA}	0.00338955	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	499.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	501.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	502.00	°R
Fully Insulated: TLA = TB	TLA	500.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.87	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	503.27	°R
Fully Insulated; Tv = TB	Tv	500.73	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.513E-05	
Partially Insulated	Wv	8.535E-05	
Fully Insulated	Wv	8.201E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0035	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0295	per day
Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0011	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	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.83	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.31	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00105	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00410	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00304	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00096	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00406	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0030936	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	16.96	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00048	0.000003	0.004	0.00073
benzene	0.0000	0.0000	0.0000	78.11	130	0.00229	0.000013	0.004	0.00382
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.004	-
toluene	0.0001	0.0000	0.0001	92.14	130	0.02438	0.000122	0.004	0.03440
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00289	0.000012	0.004	0.00354
xylenes	0.0002	0.0001	0.0002	106.17	130	0.05584	0.000242	0.004	0.06837
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.18E-04	1.14E-06	0.004	3.22E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.004	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	188	86.18	0.00000	6.878	1171.5	224.37	1.1808
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1862
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0543
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0470
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0010
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) — DECEMBER

Tank No.	WHFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		1.35E-06	ton/month
Time Period		December	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	422.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	3.71	ft
Throughput	Q	250	gal/month
Turnovers	N	11.60	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.002340269	
Partially Insulated	P_{VA}	0.002346638	
Fully Insulated	P_{VA}	0.002260914	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	488.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	490.51	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	490.59	°R
Fully Insulated: TLA = TB	TLA	489.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	491.27	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	491.59	°R
Fully Insulated; Tv = TB	Tv	489.58	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.771E-05	
Partially Insulated	Wv	5.783E-05	
Fully Insulated	Wv	5.594E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0023	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0252	per day
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0023	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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	14.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	13.00	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00062	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00267	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00205	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00057	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00264	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0020791	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	16.96	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00052	0.000002	0.002	0.00079
benzene	0.0000	0.0000	0.0000	78.11	130	0.00243	0.000009	0.002	0.00404
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02478	0.000082	0.002	0.03496
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00279	0.000008	0.002	0.00342
xylenes	0.0001	0.0000	0.0001	106.17	130	0.05376	0.000154	0.002	0.06583
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.68E-04	6.37E-07	0.002	2.72E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	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	188	86.18	0.00000	6.878	1171.5	224.37	0.8475
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1253
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0347
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0300
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0006
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	W-3		Tank type: Horizontal Fixed Roof Tank
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**25.41**	lb/year
		0.01	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**13.73**	ft
Throughput	Q	**75,600**	gal/yr
Turnovers	N	**10.87**	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	**6.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**3.14**	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)		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; Sum of Components, PVAi=(0.019337)10^(A-(B/(TLA+C)))			
Not Insulated	P_{VA}	0.07325926	
Partially Insulated	P_{VA}	0.07380657	
Fully Insulated	P_{VA}	0.06662447	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.407E-03	
Partially Insulated	Wv	1.416E-03	
Fully Insulated	Wv	1.292E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**11.19**	lb/yr
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0014	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**14.22**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	10,105	ft3/yr
Working Loss Turnover Factor	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	0.0733	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0468**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0733	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/yr**						
Product	additive						
Total HAP Emissions =	**25.411**	**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	106.17	0.00000	0.000000	0.073	-
benzene	0.0000	78.11	106.17	0.00000	0.000000	0.073	-
2,2,4 TMP	0.0000	114.23	106.17	0.00000	0.000000	0.073	-
toluene	0.0000	92.14	106.17	0.00000	0.000000	0.073	-
ethylbenzene	6.4985	106.17	106.17	0.25574	0.018735	0.073	**0.25574**
xylenes	18.9125	106.17	106.17	0.74426	0.054524	0.073	**0.74426**
naphthalene	0.0000	128.17	106.17	0.00E+00	0.00E+00	0.073	**0.00E+00**
cumene	0.0000	120.19	106.17	0.00E+00	0.00E+00	0.073	**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	1.5971
benzene	0.0000000	106.17	78.11	0.00000	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0000000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2670
ethylbenzene	0.2300000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0815
xylenes	0.7700000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0708
naphthalene	0.0000000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0017
cumene	0.0000000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.65**	lb/month
		3.26E-04	ton/month
Time Period		**January**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**10.66**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.02513171	
Partially Insulated	P_{VA}	0.02522891	
Fully Insulated	P_{VA}	0.02392845	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R
Fully Insulated: TLA = TB	**TLA**	**484.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.113E-04	
Partially Insulated	Wv	5.129E-04	
Fully Insulated	Wv	4.890E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.22**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0005	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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**	**0.43**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0005	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	0.0251	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0301**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0251	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.60**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.11**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.652**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**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	106	0.00000	0.000000	0.025	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.025	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.025	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.025	-
ethylbenzene	0.1677	0.0570	0.1107	106.17	106	0.25714	0.006462	0.025	**0.25714**
xylenes	0.4845	0.1646	0.3199	106.17	106	0.74286	0.018669	0.025	**0.74286**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.025	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.025	**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	0.7246
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1039
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0281
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0242
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0004
naphthalene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.78**	lb/month
		3.91E-04	ton/month
Time Period		**February**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**11.80**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.02911926	
Partially Insulated	P_{VA}	0.02928334	
Fully Insulated	P_{VA}	0.02710937	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R
Fully Insulated: TLA = TB	**TLA**	**487.2**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.876E-04	
Partially Insulated	Wv	5.902E-04	
Fully Insulated	Wv	5.506E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.29**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0006	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	28	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.49**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0006	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	0.0291	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0375**	**per day**
Average Daily Vapor Temperature Range	ΔTv	20.35	°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	0.0291	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**20.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**18.75**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**0.782**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**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	106	0.00000	0.000000	0.029	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.029	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.029	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.029	-
ethylbenzene	0.2008	0.0737	0.1271	106.17	106	0.25696	0.007483	0.029	**0.25696**
xylenes	0.5808	0.2131	0.3676	106.17	106	0.74304	0.021637	0.029	**0.74304**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.029	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.029	**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	0.8076
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1183
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0325
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0281
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0005
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.30**	lb/month
		6.49E-04	ton/month
Time Period		**March**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**10.66**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.04375479	
Partially Insulated	P_{VA}	0.04407997	
Fully Insulated	P_{VA}	0.03981282	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R
Fully Insulated: TLA = TB	**TLA**	**496.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.639E-04	
Partially Insulated	Wv	8.689E-04	
Fully Insulated	Wv	7.930E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.57**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0009	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**	**0.73**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0438	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0457**	**per day**
Average Daily Vapor Temperature Range	ΔTv	24.89	°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	0.0438	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**24.89**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**23.15**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**1.297**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	**L_{Ti} (lb/month)**	**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	106	0.00000	0.000000	0.044	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.044	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.044	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.044	-
ethylbenzene	0.3326	0.1461	0.1866	106.17	106	0.25645	0.011221	0.044	**0.25645**
xylenes	0.9644	0.4235	0.5409	106.17	106	0.74355	0.032534	0.044	**0.74355**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.044	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.044	**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	1.0907
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1694
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0488
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0423
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0009
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	LT	2.34	lb/month
		1.17E-03	ton/month
Time Period		April	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1496.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	13.73	ft
Throughput	Q	6,300	gal/month
Turnovers	N	11.02	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.07458828	
Partially Insulated	P_{VA}	0.07529363	
Fully Insulated	P_{VA}	0.06613611	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.61	°R
Fully Insulated: TLA = TB	TLA	510.1	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	516.04	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	517.17	°R
Fully Insulated; Tv = TB	Tv	510.05	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.430E-03	
Partially Insulated	Wv	1.440E-03	
Fully Insulated	Wv	1.283E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	1.14	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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	1.20	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0746	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0571	per day
Average Daily Vapor Temperature Range	ΔTv	31.42	°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	0.0746	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	31.42	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	29.41	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	464.96	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	2.343

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)	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	106	0.00000	0.000000	0.075	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.075	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.075	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.075	-
ethylbenzene	0.5990	0.2911	0.3079	106.17	106	0.25571	0.019073	0.075	0.25571
xylenes	1.7436	0.8473	0.8963	106.17	106	0.74429	0.055515	0.075	0.74429
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.075	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	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	1.6185
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2713
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0829
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0721
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	LT	3.63	lb/month
		1.82E-03	ton/month
Time Period		May	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1739.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	13.73	ft
Throughput	Q	6,300	gal/month
Turnovers	N	10.66	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.11144355	
Partially Insulated	P_{VA}	0.11260328	
Fully Insulated	P_{VA}	0.0976197	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	517.90	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	524.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	525.06	°R
Fully Insulated: TLA = TB	TLA	520.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	527.89	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	529.20	°R
Fully Insulated; Tv = TB	Tv	520.93	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.089E-03	
Partially Insulated	Wv	2.105E-03	
Fully Insulated	Wv	1.854E-03	

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	465.0	ft3
Stock Vapor Density	Wv	0.0021	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	1.76	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0021	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	0.1114	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0623	per day
Average Daily Vapor Temperature Range	ΔTv	34.87	°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	0.1114	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	34.87	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	32.77	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	464.96	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	3.634

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)	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	106	0.00000	0.000000	0.111	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.111	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.111	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.111	-
ethylbenzene	0.9271	0.4785	0.4487	106.17	106	0.25510	0.028429	0.111	0.25510
xylenes	2.7073	1.3971	1.3102	106.17	106	0.74490	0.083014	0.111	0.74490
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.111	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.111	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	2.1802
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.3870
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1236
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1078
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0030
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	LT	4.88	lb/month
		2.44E-03	ton/month
Time Period		June	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1853.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	6.28	ft
Diameter	D	13.73	ft
Throughput	Q	6,300	gal/month
Turnovers	N	11.02	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	5.28	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	3.14	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)		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}	0.1556972	
Partially Insulated	P_{VA}	0.15734425	
Fully Insulated	P_{VA}	0.13607975	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	527.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	534.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	535.08	°R
Fully Insulated: TLA = TB	TLA	530.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	538.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	539.49	°R
Fully Insulated; Tv = TB	Tv	530.67	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.863E-03	
Partially Insulated	Wv	2.886E-03	
Fully Insulated	Wv	2.537E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	2.47	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0029	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	2.41	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0029	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	0.1557	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0618	per day
Average Daily Vapor Temperature Range	ΔTv	35.28	°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	0.1557	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.28	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.31	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	464.96	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	4.879

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)	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	106	0.00000	0.000000	0.156	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.156	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.156	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.156	-
ethylbenzene	1.2420	0.6283	0.6137	106.17	106	0.25456	0.039634	0.156	0.25456
xylenes	3.6371	1.8400	1.7971	106.17	106	0.74544	0.116064	0.156	0.74544
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.156	0.00E+00
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.156	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	2.7955
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5206
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1723
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1507
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0046
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.57**	lb/month
		2.79E-03	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**10.66**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.1770708	
Partially Insulated	P_{VA}	0.17892849	
Fully Insulated	P_{VA}	0.15493119	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.232E-03	
Partially Insulated	Wv	3.257E-03	
Fully Insulated	Wv	2.867E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.85**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0032	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	31	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**2.72**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.1771	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0612**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°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	0.1771	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.573**

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)**	**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	106	0.00000	0.000000	0.177	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.177	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.177	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.177	-
ethylbenzene	1.4173	0.7252	0.6922	106.17	106	0.25434	0.045036	0.177	**0.25434**
xylenes	4.1553	2.1260	2.0292	106.17	106	0.74566	0.132035	0.177	**0.74566**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.177	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.177	**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	3.0764
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5836
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1958
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1715
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0054
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**5.01**	lb/month
		2.51E-03	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**10.66**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.16540538	
Partially Insulated	P_{VA}	0.16693979	
Fully Insulated	P_{VA}	0.14699061	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.033E-03	
Partially Insulated	Wv	3.054E-03	
Fully Insulated	Wv	2.728E-03	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**2.46**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0030	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**	**2.55**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.1654	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	32.39	°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	0.1654	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	**°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	**0.00000**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**5.011**

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)**	**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	106	0.00000	0.000000	0.165	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.165	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.165	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.165	-
ethylbenzene	1.2750	0.6251	0.6499	106.17	106	0.25445	0.042088	0.165	**0.25445**
xylenes	3.7357	1.8315	1.9042	106.17	106	0.74555	0.123317	0.165	**0.74555**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.165	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.165	**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	2.9242
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.5493
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1830
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1602
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0050
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**3.48**	lb/month
		1.74E-03	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**11.02**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.12100742	
Partially Insulated	P_{VA}	0.12193693	
Fully Insulated	P_{VA}	0.10975059	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.261E-03	
Partially Insulated	Wv	2.274E-03	
Fully Insulated	Wv	2.071E-03	

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	465.0	ft3
Stock Vapor Density	Wv	0.0023	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**1.90**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0023	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	0.1210	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0501**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°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	0.1210	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	**lb/month**
Product	additive
Total HAP Emissions =	**3.483**

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)**	**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	106	0.00000	0.000000	0.121	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.121	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.121	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.121	-
ethylbenzene	0.8881	0.4026	0.4855	106.17	106	0.25497	0.030853	0.121	**0.25497**
xylenes	2.5951	1.1766	1.4185	106.17	106	0.74503	0.090154	0.121	**0.74503**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.121	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.121	**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	2.3177
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.4163
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.1341
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.1171
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0033
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**2.05**	lb/month
		1.02E-03	ton/month
Time Period		**October**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**10.66**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.0742607	
Partially Insulated	P_{VA}	0.07467428	
Fully Insulated	P_{VA}	0.06919088	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R
Fully Insulated: TLA = TB	**TLA**	**511.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.427E-03	
Partially Insulated	Wv	1.433E-03	
Fully Insulated	Wv	1.339E-03	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.84**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0014	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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**	**1.20**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0743	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0410**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.18	°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	0.0743	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.18**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**21.33**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**2.046**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.074	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.074	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.074	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.074	-
ethylbenzene	0.5231	0.2158	0.3073	106.17	106	0.25572	0.018990	0.074	**0.25572**
xylenes	1.5225	0.6281	0.8945	106.17	106	0.74428	0.055271	0.074	**0.74428**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.074	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.074	**0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.6132
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.2702
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0826
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0718
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0018
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**1.20**	lb/month
		6.00E-04	ton/month
Time Period		**November**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**11.02**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.04871392	
Partially Insulated	P_{VA}	0.04888755	
Fully Insulated	P_{VA}	0.04656051	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R
Fully Insulated: TLA = TB	**TLA**	**500.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.584E-04	
Partially Insulated	Wv	9.611E-04	
Fully Insulated	Wv	9.200E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.39**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0010	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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**	**0.81**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0487	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0294**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.83	°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	0.0487	psia
Average Daily Liquid Surface Temperature	TLA	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.31**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**1.200**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.049	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.049	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.049	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.049	-
ethylbenzene	0.3076	0.1008	0.2069	106.17	106	0.25631	0.012486	0.049	**0.25631**
xylenes	0.8926	0.2923	0.6002	106.17	106	0.74369	0.036228	0.049	**0.74369**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.049	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.049	**0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	1.1808
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1862
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0543
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0470
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0010
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	W-3		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.75**	lb/month
		3.77E-04	ton/month
Time Period		**December**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**6.28**	ft
Diameter	D	**13.73**	ft
Throughput	Q	**6,300**	gal/month
Turnovers	N	**10.66**	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	**5.28**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 $H_{E)}$	HL	**3.14**	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)		**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}	0.03108539	
Partially Insulated	P_{VA}	0.03117819	
Fully Insulated	P_{VA}	0.02993067	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R
Fully Insulated: TLA = TB	**TLA**	**489.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.260E-04	
Partially Insulated	Wv	6.275E-04	
Fully Insulated	Wv	6.049E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.23**	lb/month
Vapor Space Volume	Vv	465.0	ft3
Stock Vapor Density	Wv	0.0006	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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**	**0.53**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	842	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	0.0006	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	0.0311	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0251**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0311	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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**	**14.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.00**	°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[A	PVX	1.00000	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	1.00000	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°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 usin	PVX	1.00000	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	1.0000000	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**464.96**	ft3
Effective Tank diameter	D_E	13.73	ft
Effective Tank Height	H_E	6.28	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	3.14	ft

HAPS Speciation	lb/month
Product	additive
Total HAP Emissions =	**0.754**
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	106	0.00000	0.000000	0.031	-
benzene	0.0000	0.0000	0.0000	78.11	106	0.00000	0.000000	0.031	-
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	106	0.00000	0.000000	0.031	-
toluene	0.0000	0.0000	0.0000	92.14	106	0.00000	0.000000	0.031	-
ethylbenzene	0.1936	0.0582	0.1354	106.17	106	0.25688	0.007985	0.031	**0.25688**
xylenes	0.5601	0.1684	0.3918	106.17	106	0.74312	0.023100	0.031	**0.74312**
naphthalene	0.0000	0.0000	0.0000	128.17	106	0.00E+00	0.00E+00	0.031	**0.00E+00**
cumene	0.0000	0.0000	0.0000	120.19	106	0.00E+00	0.00E+00	0.031	**0.00E+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	0.00000	106.17	86.18	0.00000	6.878	1171.5	224.37	0.8475
benzene	0.00000	106.17	78.11	0.00000	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	106.17	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00000	106.17	92.14	0.00000	7.017	1377.6	222.64	0.1253
ethylbenzene	0.23000	106.17	106.17	0.23000	6.95	1419.3	212.61	0.0347
xylenes	0.77000	106.17	106.17	0.77000	7.009	1462.3	215.11	0.0300
naphthalene	0.00000	106.17	128.17	0.00000	7.146	1831.6	211.82	0.0006
cumene	0.00000	106.17	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	D-Fire Pump	Tank type	Horizontal Fixed Roof Tank
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.08**	lb/year
		0.00	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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			
Effective Height H_E = (Pi)D/4	H_E	**3.14**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**3.71**	ft
Throughput	Q	**3,000**	gal/yr
Turnovers	N	**11.82**	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	**3.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		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}	0.00516155	
Partially Insulated	P_{VA}	0.00519755	
Fully Insulated	P_{VA}	0.00472428	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.214E-04	
Partially Insulated	Wv	1.221E-04	
Fully Insulated	Wv	1.122E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.04**	lb/yr
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.05**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	401	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0470**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00230**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00642	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00412	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 usin	PVX	0.00637	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0042189	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/yr
Product	Diesel
Total HAP Emissions =	**0.007**

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	0.0000	86.18	130	0.00045	0.000003	0.005	**0.00067**
benzene	0.0002	78.11	130	0.00217	0.000019	0.005	**0.00360**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.0020	92.14	130	0.02394	0.000174	0.005	**0.03377**
ethylbenzene	0.0002	106.17	130	0.00297	0.000019	0.005	**0.00363**
xylenes	0.0048	106.17	130	0.05753	0.000364	0.005	**0.07045**
naphthalene	0.0000	128.17	130	3.69E-04	1.93E-06	0.005	**3.74E-04**
cumene	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	**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	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.5971
benzene	0.0000080	188	78.11	0.00002	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	188	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0003200	188	92.14	0.00065	7.017	1377.6	222.64	0.2670
ethylbenzene	0.0001300	188	106.17	0.00023	6.95	1419.3	212.61	0.0815
xylenes	0.0029000	188	106.17	0.00514	7.009	1462.3	215.11	0.0708
naphthalene	0.0007565	188	128.17	0.00111	7.146	1831.6	211.82	0.0017
cumene	0.0000000	188	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	D-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.00**	lb/month	Vapor Space Volume	Vv	17.0	ft3
		1.18E-06	ton/month	Stock Vapor Density	Wv	0.0000	lb/ft3
Time Period		**January**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**532.0**	Btu/ft²-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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=1	KN	1.0000	
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	0.0000	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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0019	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0301**	**per day**
Diameter	D	**3.71**	ft	Average Daily Vapor Temperature Range	ΔTv	16.60	°R
Throughput	Q	**250**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0006	psi
Turnovers	N	**11.60**	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	0.0019	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	485.35	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**16.60**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**15.11**	°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	**0.00061**	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[A	PVX	0.00225	psia
	PBV	**-0.03**		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00165	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	489.50	°R
Not Insulated	P_{VA}	0.00192896		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°R
Partially Insulated	P_{VA}	0.00193573					
Fully Insulated	P_{VA}	0.00184511		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00055**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00223	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**483.25**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0016763	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°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**	**16.96**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**485.35**	°R	Effective Tank diameter	D_E	3.71	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**485.44**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**484.2**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**486.30**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**486.71**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**484.18**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	4.805E-05					
Partially Insulated	Wv	4.818E-05					
Fully Insulated	Wv	4.617E-05					

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000
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)	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	130	0.00054	0.000002	0.002	**0.00082**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00249	0.000008	0.002	**0.00415**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02493	0.000068	0.002	**0.03517**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00274	0.000006	0.002	**0.00335**
xylenes	0.0001	0.0000	0.0001	106.17	130	0.05271	0.000125	0.002	**0.06455**
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.47E-04	4.84E-07	0.002	**2.51E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	**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	188	86.18	0.00000	6.878	1171.5	224.37	0.7246
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1039
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0281
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0242
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0004
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	D-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.00**	lb/month	Vapor Space Volume	Vv	17.0	ft3
		1.40E-06	ton/month	Stock Vapor Density	Wv	0.0001	lb/ft3
Time Period		**February**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.038	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**789.0**	Btu/ft²-day	Constant; Number of Daily Events in a Year	365	28	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0022	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0376**	**per day**
Diameter	D	**3.71**	ft	Average Daily Vapor Temperature Range	ΔTv	20.35	°R
Throughput	Q	**250**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0008	psi
Turnovers	N	**12.84**	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	0.0022	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	488.91	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**20.35**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**18.75**	°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	**0.00084**	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[A	PVX	0.00266	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00182	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	494.00	°R
Not Insulated	P_{VA}	0.00220504		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°R
Partially Insulated	P_{VA}	0.00221635					
Fully Insulated	P_{VA}	0.00206621		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00078**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00263	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**485.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0018581	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°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**	**16.96**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**488.91**	°R	Effective Tank diameter	D_E	3.71	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**489.05**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**487.2**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**490.33**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**490.93**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**487.17**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	5.448E-05					
Partially Insulated	Wv	5.469E-05					
Fully Insulated	Wv	5.138E-05					

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000
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)	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	130	0.00053	0.000002	0.002	**0.00080**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00245	0.000009	0.002	**0.00408**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02482	0.000077	0.002	**0.03503**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00277	0.000007	0.002	**0.00340**
xylenes	0.0001	0.0001	0.0001	106.17	130	0.05344	0.000144	0.002	**0.06544**
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.62E-04	5.86E-07	0.002	**2.66E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	**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	188	86.18	0.00000	6.878	1171.5	224.37	0.8076
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1183
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0325
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0281
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0005
naphthalene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	D-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units	ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.00**	lb/month	Vapor Space Volume	Vv	17.0	ft3
		2.23E-06	ton/month	Stock Vapor Density	Wv	0.0001	lb/ft3
Time Period		**March**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.046	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1096.0**	Btu/ft²-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0032	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0458**	**per day**
Diameter	D	**3.71**	ft	Average Daily Vapor Temperature Range	ΔTv	24.89	°R
Throughput	Q	**250**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0014	psi
Turnovers	N	**11.60**	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	0.0032	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	499.12	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**24.89**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**23.15**	°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	**0.00143**	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[A	PVX	0.00399	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00256	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	505.35	°R
Not Insulated	P_{VA}	0.00320093		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°R
Partially Insulated	P_{VA}	0.00322282					
Fully Insulated	P_{VA}	0.00293485		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00134**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00395	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**494.80**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0026144	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°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**	**16.96**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**499.12**	°R	Effective Tank diameter	D_E	3.71	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**499.31**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**496.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**501.09**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**501.92**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**496.71**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	7.739E-05					
Partially Insulated	Wv	7.779E-05					
Fully Insulated	Wv	7.158E-05					

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000
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)	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	130	0.00049	0.000002	0.003	**0.00074**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00233	0.000012	0.003	**0.00387**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.003	-
toluene	0.0001	0.0000	0.0001	92.14	130	0.02448	0.000111	0.003	**0.03454**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00287	0.000011	0.003	**0.00351**
xylenes	0.0002	0.0001	0.0001	106.17	130	0.05536	0.000217	0.003	**0.06778**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.05E-04	9.92E-07	0.003	**3.10E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.003	**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	188	86.18	0.00000	6.878	1171.5	224.37	1.0907
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1694
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0488
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0423
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) **APRIL**

Tank No.	D-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month	Vapor Space Volume	Vv	17.0	ft3
		3.85E-06	ton/month	Stock Vapor Density	Wv	0.0001	lb/ft3
Time Period		**April**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft²-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0052	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0573**	**per day**
Diameter	D	**3.71**	ft	Average Daily Vapor Temperature Range	ΔTv	31.42	°R
Throughput	Q	**250**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0028	psi
Turnovers	N	**11.98**	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	0.0052	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.35	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**31.42**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**29.41**	°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	**0.00281**	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[A	PVX	0.00682	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00401	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	521.21	°R
Not Insulated	P_{VA}	0.00524895		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°R
Partially Insulated	P_{VA}	0.00529531					
Fully Insulated	P_{VA}	0.00469203		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00265**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00676	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0041162	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°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**	**16.96**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R	Effective Tank diameter	D_E	3.71	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**510.1**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.232E-04					
Partially Insulated	Wv	1.240E-04					
Fully Insulated	Wv	1.114E-04					

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
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)**	**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	130	0.00045	0.000004	0.005	**0.00067**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00216	0.000019	0.005	**0.00360**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.0002	0.0001	0.0001	92.14	130	0.02392	0.000177	0.005	**0.03374**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00297	0.000019	0.005	**0.00364**
xylenes	0.0004	0.0002	0.0002	106.17	130	0.05761	0.000370	0.005	**0.07053**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.71E-04	1.98E-06	0.005	**3.76E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	**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	188	86.18	0.00000	6.878	1171.5	224.37	1.6185
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2713
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0829
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0721
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) **MAY**

Tank No.	D-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month	Vapor Space Volume	Vv	17.0	ft3
		5.83E-06	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**May**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.063	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft²-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.01**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0077	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0626**	**per day**
Diameter	D	**3.71**	ft	Average Daily Vapor Temperature Range	ΔTv	34.87	°R
Throughput	Q	**250**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0044	psi
Turnovers	N	**11.60**	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	0.0077	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	524.76	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**34.87**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**32.77**	°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	**0.00435**	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[A	PVX	0.01010	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00575	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	533.48	°R
Not Insulated	P_{VA}	0.00765407		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°R
Partially Insulated	P_{VA}	0.0077293					
Fully Insulated	P_{VA}	0.00675547		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00412**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01003	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0059069	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°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**	**16.96**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R	Effective Tank diameter	D_E	3.71	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**520.9**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.757E-04					
Partially Insulated	Wv	1.769E-04					
Fully Insulated	Wv	1.571E-04					

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
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)**	**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	130	0.00041	0.000005	0.008	**0.00062**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00203	0.000026	0.008	**0.00339**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.008	**-**
toluene	0.0003	0.0001	0.0001	92.14	130	0.02340	0.000253	0.008	**0.03301**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00304	0.000028	0.008	**0.00372**
xylenes	0.0007	0.0003	0.0003	106.17	130	0.05907	0.000554	0.008	**0.07233**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.28E-04	3.32E-06	0.008	**4.34E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.008	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.1802
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3870
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1236
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1078
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0030
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) **JUNE**

Tank No.	D-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month	Vapor Space Volume	Vv	17.0	ft3
		7.70E-06	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**June**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft²-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.01**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0105	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0623**	**per day**
Diameter	D	**3.71**	ft	Average Daily Vapor Temperature Range	ΔTv	35.28	°R
Throughput	Q	**250**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0058	psi
Turnovers	N	**11.98**	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	0.0105	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	534.76	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**2.14**	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	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.28**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.31**	°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	**0.00583**	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[A	PVX	0.01378	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00795	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	543.58	°R
Not Insulated	P_{VA}	0.01051319		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°R
Partially Insulated	P_{VA}	0.01061923					
Fully Insulated	P_{VA}	0.00924836		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00554**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01371	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0081618	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°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**	**16.96**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R	Effective Tank diameter	D_E	3.71	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**530.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.367E-04					
Partially Insulated	Wv	2.385E-04					
Fully Insulated	Wv	2.111E-04					

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
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)**	**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	130	0.00038	0.000006	0.011	**0.00058**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00193	0.000034	0.011	**0.00321**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.0004	0.0002	0.0002	92.14	130	0.02292	0.000340	0.011	**0.03233**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00308	0.000040	0.011	**0.00377**
xylenes	0.0009	0.0005	0.0005	106.17	130	0.06013	0.000774	0.011	**0.07362**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.79E-04	5.11E-06	0.011	**4.86E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.7955
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5206
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1723
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1507
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0046
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	D-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month
		8.75E-06	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.01188794	
Partially Insulated	P_{VA}	0.01200729	
Fully Insulated	P_{VA}	0.01046386	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	°R
Fully Insulated; Tv = TB	**Tv**	**534.61**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.657E-04	
Partially Insulated	Wv	2.676E-04	
Fully Insulated	Wv	2.371E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0119	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0617**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	0.0065	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	0.0119	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00648**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01551	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00903	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00617**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01544	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0092662	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.002**
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)**	**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	130	0.00037	0.000007	0.012	**0.00056**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00189	0.000037	0.012	**0.00315**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.012	**-**
toluene	0.0004	0.0002	0.0002	92.14	130	0.02272	0.000381	0.012	**0.03205**
ethylbenzene	0.0001	0.0000	0.0000	106.17	130	0.00310	0.000045	0.012	**0.00379**
xylenes	0.0011	0.0005	0.0005	106.17	130	0.06049	0.000881	0.012	**0.07407**
naphthalene	0.0000	0.0000	0.0000	128.17	130	5.01E-04	6.04E-06	0.012	**5.08E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.012	**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	188	86.18	0.00000	6.878	1171.5	224.37	3.0764
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5836
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1958
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1715
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0054
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	D-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month
		7.90E-06	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.60**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.01113798	
Partially Insulated	P_{VA}	0.01123667	
Fully Insulated	P_{VA}	0.00995225	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	°R
Fully Insulated; Tv = TB	**Tv**	**533.00**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.501E-04	
Partially Insulated	Wv	2.517E-04	
Fully Insulated	Wv	2.262E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0111	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0566**	**per day**
Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	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	0.0111	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	°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	**0.00562**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01426	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00864	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00532**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01417	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0088491	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
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)**	**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	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00191	0.000035	0.011	**0.00318**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.0004	0.0002	0.0002	92.14	130	0.02282	0.000359	0.011	**0.03220**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00309	0.000042	0.011	**0.00378**
xylenes	0.0010	0.0004	0.0005	106.17	130	0.06030	0.000822	0.011	**0.07384**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.89E-04	5.53E-06	0.011	**4.96E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.9242
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5493
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1830
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1602
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0050
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	D-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		5.59E-06	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	**3.14**	ft
Diameter	D	**3.71**	ft
Throughput	Q	**250**	gal/month
Turnovers	N	**11.98**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.00827392	
Partially Insulated	P_{VA}	0.00833409	
Fully Insulated	P_{VA}	0.0075442	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	°R
Fully Insulated; Tv = TB	**Tv**	**524.31**	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.893E-04	
Partially Insulated	Wv	1.903E-04	
Fully Insulated	Wv	1.743E-04	

ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0002	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0083	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0504**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Average Daily Vapor Pressure Range	ΔPv	0.0038	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	0.0083	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00381**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01037	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00656	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00358**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01029	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0067140	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**16.96**	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
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)**	**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	130	0.00041	0.000005	0.008	**0.00061**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00201	0.000028	0.008	**0.00334**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.008	**-**
toluene	0.0003	0.0001	0.0001	92.14	130	0.02329	0.000272	0.008	**0.03285**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00305	0.000031	0.008	**0.00373**
xylenes	0.0007	0.0003	0.0004	106.17	130	0.05935	0.000601	0.008	**0.07267**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.40E-04	3.69E-06	0.008	**4.46E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.008	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.3177
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4163
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1341
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1171
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0033
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	D-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.01	lb/month
		3.39E-06	ton/month
Time Period		October	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	882.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	3.71	ft
Throughput	Q	250	gal/month
Turnovers	N	11.60	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.00522741	
Partially Insulated	P_{VA}	0.0052546	
Fully Insulated	P_{VA}	0.00489362	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	509.75	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.23	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.38	°R
Fully Insulated: TLA = TB	TLA	511.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.81	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.48	°R
Fully Insulated; Tv = TB	Tv	511.28	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.230E-04	
Partially Insulated	Wv	1.235E-04	
Fully Insulated	Wv	1.159E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0412	per day
Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Average Daily Vapor Pressure Range	ΔPv	0.0021	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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	23.18	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	21.33	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00206	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00635	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00429	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00190	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00628	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0043797	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	16.96	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.001

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)	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	130	0.00045	0.000004	0.005	0.00067
benzene	0.0000	0.0000	0.0000	78.11	130	0.00216	0.000019	0.005	0.00360
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.005	-
toluene	0.0002	0.0001	0.0001	92.14	130	0.02392	0.000176	0.005	0.03375
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00297	0.000019	0.005	0.00364
xylenes	0.0004	0.0002	0.0002	106.17	130	0.05759	0.000369	0.005	0.07051
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.71E-04	1.97E-06	0.005	3.76E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	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	188	86.18	0.00000	6.878	1171.5	224.37	1.6132
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2702
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0826
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0718
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	D-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		2.06E-06	ton/month
Time Period		November	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	534.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	3.71	ft
Throughput	Q	250	gal/month
Turnovers	N	11.98	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.00353392	
Partially Insulated	P_{VA}	0.00354555	
Fully Insulated	P_{VA}	0.00338955	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	499.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	501.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	502.00	°R
Fully Insulated: TLA = TB	TLA	500.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.87	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	503.27	°R
Fully Insulated; Tv = TB	Tv	500.73	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.513E-05	
Partially Insulated	Wv	8.535E-05	
Fully Insulated	Wv	8.201E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0035	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0295	per day
Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0011	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	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.83	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.31	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00105	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00410	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00304	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00096	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00406	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0030936	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	16.96	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00048	0.000003	0.004	0.00073
benzene	0.0000	0.0000	0.0000	78.11	130	0.00229	0.000013	0.004	0.00382
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.004	-
toluene	0.0001	0.0000	0.0001	92.14	130	0.02438	0.000122	0.004	0.03440
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00289	0.000012	0.004	0.00354
xylenes	0.0002	0.0001	0.0002	106.17	130	0.05584	0.000242	0.004	0.06837
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.18E-04	1.14E-06	0.004	3.22E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.004	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	188	86.18	0.00000	6.878	1171.5	224.37	1.1808
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1862
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0543
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0470
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0010
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	D-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		1.35E-06	ton/month
Time Period		December	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	422.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	3.14	ft
Diameter	D	3.71	ft
Throughput	Q	250	gal/month
Turnovers	N	11.60	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.002340269	
Partially Insulated	P_{VA}	0.002346638	
Fully Insulated	P_{VA}	0.002260914	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	488.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	490.51	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	490.59	°R
Fully Insulated: TLA = TB	TLA	489.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	491.27	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	491.59	°R
Fully Insulated; Tv = TB	Tv	489.58	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.771E-05	
Partially Insulated	Wv	5.783E-05	
Fully Insulated	Wv	5.594E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	17.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	33	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	0.0001	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	0.0023	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0252	per day
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0023	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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	14.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	13.00	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00062	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00267	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00205	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00057	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00264	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0020791	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	16.96	ft3
Effective Tank diameter	D_E	3.71	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00052	0.000002	0.002	0.00079
benzene	0.0000	0.0000	0.0000	78.11	130	0.00243	0.000009	0.002	0.00404
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02478	0.000082	0.002	0.03496
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00279	0.000008	0.002	0.00342
xylenes	0.0001	0.0000	0.0001	106.17	130	0.05376	0.000154	0.002	0.06583
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.68E-04	6.37E-07	0.002	2.72E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	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	188	86.18	0.00000	6.878	1171.5	224.37	0.8475
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1253
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0347
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0300
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0006
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.	R-Fire Pump		Tank type
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.05**	lb/year
		0.00	ton/year
Time Period		**Annual**	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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			
Effective Height H_E = (Pi)D/4	H_E	**1.96**	ft
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**3.61**	ft
Throughput	Q	**1,500**	gal/yr
Turnovers	N	**10.00**	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	**1.96**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft
Liquid height (assume 1/2 H_E)	HL	**0.98**	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)		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}	0.0051615	
Partially Insulated	P_{VA}	0.0051975	
Fully Insulated	P_{VA}	0.0047243	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R
Fully Insulated: TLA = TB	**TLA**	**510.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.214E-04	
Partially Insulated	Wv	1.221E-04	
Fully Insulated	Wv	1.122E-04	

Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.02**	lb/yr
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0001	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	365	days/year
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.02**	lb/yr
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	201	ft3/yr
Working Loss Turnover Factor	KN	1.0000	
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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0470**	**per day**
Average Daily Vapor Temperature Range	ΔTv	26.15	°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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	512.85	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**26.15**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**24.37**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00230**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00642	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00412	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.39	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°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 using	PVX	0.00637	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0042189	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	506.97	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**10.02**	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/yr						
Product	Diesel						
Total HAP Emissions =	**0.004**	**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	130	0.00045	0.000003	0.005	**0.00067**
benzene	0.0001	78.11	130	0.00217	0.000019	0.005	**0.00360**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.0011	92.14	130	0.02394	0.000174	0.005	**0.03377**
ethylbenzene	0.0001	106.17	130	0.00297	0.000019	0.005	**0.00363**
xylenes	0.0026	106.17	130	0.05753	0.000364	0.005	**0.07045**
naphthalene	0.0000	128.17	130	3.69E-04	1.93E-06	0.005	**3.74E-04**
cumene	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	**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	0.0000010	188	86.18	0.00000	6.878	1171.5	224.37	1.5971
benzene	0.0000080	188	78.11	0.00002	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	188	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0003200	188	92.14	0.00065	7.017	1377.6	222.64	0.2670
ethylbenzene	0.0001300	188	106.17	0.00023	6.95	1419.3	212.61	0.0815
xylenes	0.0029000	188	106.17	0.00514	7.009	1462.3	215.11	0.0708
naphthalene	0.0007565	188	128.17	0.00111	7.146	1831.6	211.82	0.0017
cumene	0.0000000	188	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		6.26E-07	ton/month
Time Period		January	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	532.0	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	1.96	ft
Diameter	D	3.61	ft
Throughput	Q	125	gal/month
Turnovers	N	9.81	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	0.96	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	0.98	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)		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}	0.001929	
Partially Insulated	P_{VA}	0.0019357	
Fully Insulated	P_{VA}	0.0018451	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	483.25	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	485.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	485.44	°R
Fully Insulated: TLA = TB	TLA	484.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	486.30	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	486.71	°R
Fully Insulated; Tv = TB	Tv	484.18	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	4.805E-05	
Partially Insulated	Wv	4.818E-05	
Fully Insulated	Wv	4.617E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0000	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0000	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	0.0019	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0301	per day
Average Daily Vapor Temperature Range	ΔTv	16.60	°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	0.0019	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.60	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.11	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00061	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00225	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00165	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00055	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00223	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0016763	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	10.02	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000
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)	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	130	0.00054	0.000002	0.002	0.00082
benzene	0.0000	0.0000	0.0000	78.11	130	0.00249	0.000008	0.002	0.00415
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0000	0.0000	0.0000	92.14	130	0.02493	0.000068	0.002	0.03517
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00274	0.000006	0.002	0.00335
xylenes	0.0001	0.0000	0.0000	106.17	130	0.05271	0.000125	0.002	0.06455
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.47E-04	4.84E-07	0.002	2.51E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	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	188	86.18	0.00000	6.878	1171.5	224.37	0.7246
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1039
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0281
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0242
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0004
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) **FEBRUARY**

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		7.42E-07	ton/month
Time Period		February	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	789.0	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	1.96	ft
Diameter	D	3.61	ft
Throughput	Q	125	gal/month
Turnovers	N	10.87	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	0.96	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	0.98	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)		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}	0.002205	
Partially Insulated	P_{VA}	0.0022163	
Fully Insulated	P_{VA}	0.0020662	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	485.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	488.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	489.05	°R
Fully Insulated: TLA = TB	TLA	487.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	490.33	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	490.93	°R
Fully Insulated; Tv = TB	Tv	487.17	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.448E-05	
Partially Insulated	Wv	5.469E-05	
Fully Insulated	Wv	5.138E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	10.0	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0001	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	0.0022	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0376	per day
Average Daily Vapor Temperature Range	ΔTv	20.35	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	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	0.0022	psia
Average Daily Liquid Surface Temperature	TLA	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	20.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	18.75	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00084	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00266	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00182	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00078	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00263	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0018581	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	10.02	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000
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)	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	130	0.00053	0.000002	0.002	0.00080
benzene	0.0000	0.0000	0.0000	78.11	130	0.00245	0.000009	0.002	0.00408
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0000	0.0000	0.0000	92.14	130	0.02482	0.000077	0.002	0.03503
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00277	0.000007	0.002	0.00340
xylenes	0.0001	0.0000	0.0000	106.17	130	0.05344	0.000144	0.002	0.06544
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.62E-04	5.86E-07	0.002	2.66E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	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	188	86.18	0.00000	6.878	1171.5	224.37	0.8076
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1183
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0325
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0281
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0005
naphthalene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) **MARCH**

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		1.20E-06	ton/month
Time Period		March	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1096.0	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	1.96	ft
Diameter	D	3.61	ft
Throughput	Q	125	gal/month
Turnovers	N	9.81	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	0.96	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	0.98	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)		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}	0.0032009	
Partially Insulated	P_{VA}	0.0032228	
Fully Insulated	P_{VA}	0.0029348	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	494.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	499.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	499.31	°R
Fully Insulated: TLA = TB	TLA	496.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	501.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	501.92	°R
Fully Insulated; Tv = TB	Tv	496.71	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.739E-05	
Partially Insulated	Wv	7.779E-05	
Fully Insulated	Wv	7.158E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	10.0	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0001	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	0.00	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	24.89	°R
Average Daily Vapor Pressure Range	ΔPv	0.0014	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	0.0032	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	24.89	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	23.15	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00143	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00399	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00256	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00134	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00395	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0026144	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	10.02	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000
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)	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	130	0.00049	0.000002	0.003	0.00074
benzene	0.0000	0.0000	0.0000	78.11	130	0.00233	0.000012	0.003	0.00387
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.003	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02448	0.000111	0.003	0.03454
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00287	0.000011	0.003	0.00351
xylenes	0.0001	0.0001	0.0001	106.17	130	0.05536	0.000217	0.003	0.06778
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.05E-04	9.92E-07	0.003	3.10E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.003	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	188	86.18	0.00000	6.878	1171.5	224.37	1.0907
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1694
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0488
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0423
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0009
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	R-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.00**	lb/month	Vapor Space Volume	Vv	10.0	ft3
		2.09E-06	ton/month	Stock Vapor Density	Wv	0.0001	lb/ft3
Time Period		**April**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1496.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0052	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**1.96**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0573**	**per day**
Diameter	D	**3.61**	ft	Average Daily Vapor Temperature Range	ΔTv	31.42	°R
Throughput	Q	**125**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0028	psi
Turnovers	N	**10.14**	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	0.0052	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	513.35	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**0.96**	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	**0.98**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**31.42**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**29.41**	°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	**0.00281**	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[A	PVX	0.00682	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00401	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	521.21	°R
Not Insulated	P_{VA}	0.0052489		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°R
Partially Insulated	P_{VA}	0.0052953					
Fully Insulated	P_{VA}	0.004692		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00265**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00676	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**507.45**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0041162	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	506.26	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°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**	**10.02**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.35**	°R	Effective Tank diameter	D_E	3.61	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.61**	°R	Effective Tank Height	H_E	1.96	ft
Fully Insulated: TLA = TB	**TLA**	**510.1**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**516.04**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**517.17**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**510.05**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.232E-04					
Partially Insulated	Wv	1.240E-04					
Fully Insulated	Wv	1.114E-04					

HAPS Speciation	**lb/month**								
Product	Diesel								
Total HAP Emissions =	**0.000**			**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)**	**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	130	0.00045	0.000004	0.005	**0.00067**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00216	0.000019	0.005	**0.00360**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.005	**-**
toluene	0.0001	0.0001	0.0000	92.14	130	0.02392	0.000177	0.005	**0.03374**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00297	0.000019	0.005	**0.00364**
xylenes	0.0002	0.0001	0.0001	106.17	130	0.05761	0.000370	0.005	**0.07053**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.71E-04	1.98E-06	0.005	**3.76E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	**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	188	86.18	0.00000	6.878	1171.5	224.37	1.6185
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2713
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0829
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0721
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	R-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month	Vapor Space Volume	Vv	10.0	ft3
		3.18E-06	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**May**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.063	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1739.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	31	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0077	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**1.96**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0626**	**per day**
Diameter	D	**3.61**	ft	Average Daily Vapor Temperature Range	ΔTv	34.87	°R
Throughput	Q	**125**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0044	psi
Turnovers	N	**9.81**	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	0.0077	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	524.76	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**0.96**	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	**0.98**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**34.87**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**32.77**	°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	**0.00435**	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[A	PVX	0.01010	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00575	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	533.48	°R
Not Insulated	P_{VA}	0.0076541		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°R
Partially Insulated	P_{VA}	0.0077293					
Fully Insulated	P_{VA}	0.0067555		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00412**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.01003	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**517.90**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0059069	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	516.87	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°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**	**10.02**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**524.76**	°R	Effective Tank diameter	D_E	3.61	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**525.06**	°R	Effective Tank Height	H_E	1.96	ft
Fully Insulated: TLA = TB	**TLA**	**520.9**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**527.89**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**529.20**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**520.93**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.757E-04					
Partially Insulated	Wv	1.769E-04					
Fully Insulated	Wv	1.571E-04					

HAPS Speciation	**lb/month**								
Product	Diesel								
Total HAP Emissions =	**0.001**			**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)**	**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	130	0.00041	0.000005	0.008	**0.00062**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00203	0.000026	0.008	**0.00339**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.008	**-**
toluene	0.0001	0.0001	0.0001	92.14	130	0.02340	0.000253	0.008	**0.03301**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00304	0.000028	0.008	**0.00372**
xylenes	0.0004	0.0002	0.0002	106.17	130	0.05907	0.000554	0.008	**0.07233**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.28E-04	3.32E-06	0.008	**4.34E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.008	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.1802
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.3870
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1236
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1078
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0030
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	R-Fire Pump						
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month	Vapor Space Volume	Vv	10.0	ft3
		4.19E-06	ton/month	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**June**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	per day
Nearest US Location		**Albany, NY**		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1853.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	30	days/month
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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=1	KN	1.0000	
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**	**1.00**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8907.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0105	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Shell height	Hs	**1.96**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0623**	**per day**
Diameter	D	**3.61**	ft	Average Daily Vapor Temperature Range	ΔTv	35.28	°R
Throughput	Q	**125**	gal/month	Average Daily Vapor Pressure Range	ΔPv	0.0058	psi
Turnovers	N	**10.14**	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	0.0105	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	534.76	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**0.96**	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	**0.98**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Tank Insulation (pick from drop down list)		**Not Insulated**		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**35.28**	**°R**
Tank Construction (pick from drop down list)		**Welded**		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**33.31**	°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	**0.00583**	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[A	PVX	0.01378	psia
		-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00795	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	543.58	°R
Not Insulated	P_{VA}	0.0105132		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°R
Partially Insulated	P_{VA}	0.0106192					
Fully Insulated	P_{VA}	0.0092484		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00554**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.01371	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**527.45**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0081618	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	526.75	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°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**	**10.02**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**534.76**	°R	Effective Tank diameter	D_E	3.61	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**535.08**	°R	Effective Tank Height	H_E	1.96	ft
Fully Insulated: TLA = TB	**TLA**	**530.7**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**538.09**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**539.49**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**530.67**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	2.367E-04					
Partially Insulated	Wv	2.385E-04					
Fully Insulated	Wv	2.111E-04					

HAPS Speciation	**lb/month**								
Product	Diesel								
Total HAP Emissions =	**0.001**			**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)**	**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	130	0.00038	0.000006	0.011	**0.00058**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00193	0.000034	0.011	**0.00321**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	**-**
toluene	0.0002	0.0001	0.0001	92.14	130	0.02292	0.000340	0.011	**0.03233**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00308	0.000040	0.011	**0.00377**
xylenes	0.0005	0.0003	0.0002	106.17	130	0.06013	0.000774	0.011	**0.07362**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.79E-04	5.11E-06	0.011	**4.86E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**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	188	86.18	0.00000	6.878	1171.5	224.37	2.7955
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5206
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1723
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1507
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0046
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) JULY

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		4.77E-06	ton/month
Time Period		**July**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1872.0**	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	**1.96**	ft
Diameter	D	**3.61**	ft
Throughput	Q	**125**	gal/month
Turnovers	N	**9.81**	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	**0.96**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**0.98**	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)		**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}	0.0118879	
Partially Insulated	P_{VA}	0.0120073	
Fully Insulated	P_{VA}	0.0104639	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**531.35**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**538.73**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**539.06**	°R
Fully Insulated: TLA = TB	**TLA**	**534.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**542.10**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**543.51**	**°R**
Fully Insulated; Tv = TB	**Tv**	**534.61**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.657E-04	
Partially Insulated	Wv	2.676E-04	
Fully Insulated	Wv	2.371E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0119	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0617**	**per day**
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	0.0065	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	0.0119	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**35.23**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**33.30**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00648**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01551	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00903	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00617**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.01544	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0092662	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**10.02**	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	130	0.00037	0.000007	0.012	**0.00056**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00189	0.000037	0.012	**0.00315**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.012	-
toluene	0.0002	0.0001	0.0001	92.14	130	0.02272	0.000381	0.012	**0.03205**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00310	0.000045	0.012	**0.00379**
xylenes	0.0006	0.0003	0.0003	106.17	130	0.06049	0.000881	0.012	**0.07407**
naphthalene	0.0000	0.0000	0.0000	128.17	130	5.01E-04	6.04E-06	0.012	**5.08E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.012	**0.00E+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	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	3.0764
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5836
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1958
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1715
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0054
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) AUGUST

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		4.29E-06	ton/month
Time Period		**August**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1640.0**	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	**1.96**	ft
Diameter	D	**3.61**	ft
Throughput	Q	**125**	gal/month
Turnovers	N	**9.81**	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	**0.96**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**0.98**	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)		**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}	0.011138	
Partially Insulated	P_{VA}	0.0112367	
Fully Insulated	P_{VA}	0.0099523	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**530.15**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**536.62**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**536.90**	°R
Fully Insulated: TLA = TB	**TLA**	**533.0**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**539.57**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**540.80**	**°R**
Fully Insulated; Tv = TB	**Tv**	**533.00**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.501E-04	
Partially Insulated	Wv	2.517E-04	
Fully Insulated	Wv	2.262E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0111	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0566**	**per day**
Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0056	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	0.0111	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**32.39**	**°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	**0.00562**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01426	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00864	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00532**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.01417	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0088491	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**10.02**	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	130	0.00038	0.000006	0.011	**0.00057**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00191	0.000035	0.011	**0.00318**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	-
toluene	0.0002	0.0001	0.0001	92.14	130	0.02282	0.000359	0.011	**0.03220**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00309	0.000042	0.011	**0.00378**
xylenes	0.0005	0.0003	0.0003	106.17	130	0.06030	0.000822	0.011	**0.07384**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.89E-04	5.53E-06	0.011	**4.96E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**0.00E+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	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.9242
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.5493
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1830
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1602
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0050
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) SEPTEMBER

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		3.01E-06	ton/month
Time Period		**September**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1300.0**	Btu/ft²-day
Absolute Pressure	P_A	14.55	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	**1.96**	ft
Diameter	D	**3.61**	ft
Throughput	Q	**125**	gal/month
Turnovers	N	**10.14**	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	**0.96**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**0.98**	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)		**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}	0.0082739	
Partially Insulated	P_{VA}	0.0083341	
Fully Insulated	P_{VA}	0.0075442	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**522.05**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**527.18**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**527.40**	°R
Fully Insulated: TLA = TB	**TLA**	**524.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**529.51**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**530.49**	**°R**
Fully Insulated; Tv = TB	**Tv**	**524.31**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.893E-04	
Partially Insulated	Wv	1.903E-04	
Fully Insulated	Wv	1.743E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0002	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	30	days/month
Working Losses; Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.00**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0083	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0504**	**per day**
Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Average Daily Vapor Pressure Range	ΔPv	0.0038	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	0.0083	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**28.59**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**26.66**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00381**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01037	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00656	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00358**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.01029	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0067140	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**10.02**	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	**lb/month**
Product	Diesel
Total HAP Emissions =	**0.001**
Eq. 40-2 $L_{Ti} = Z_{Vi}(L_T)$	

Individual HAPS	L_{Ti} (lb/month)	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	130	0.00041	0.000005	0.008	**0.00061**
benzene	0.0000	0.0000	0.0000	78.11	130	0.00201	0.000028	0.008	**0.00334**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.008	-
toluene	0.0001	0.0001	0.0001	92.14	130	0.02329	0.000272	0.008	**0.03285**
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00305	0.000031	0.008	**0.00373**
xylenes	0.0004	0.0002	0.0002	106.17	130	0.05935	0.000601	0.008	**0.07267**
naphthalene	0.0000	0.0000	0.0000	128.17	130	4.40E-04	3.69E-06	0.008	**4.46E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.008	**0.00E+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	0.00000	188	86.18	0.00000	6.878	1171.5	224.37	2.3177
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.4163
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.1341
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.1171
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0033
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) — OCTOBER

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		1.81E-06	ton/month
Time Period		October	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	882.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	1.96	ft
Diameter	D	3.61	ft
Throughput	Q	125	gal/month
Turnovers	N	9.81	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	0.96	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	0.98	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)		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}	0.0052274	
Partially Insulated	P_{VA}	0.0052546	
Fully Insulated	P_{VA}	0.0048936	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	509.75	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.23	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.38	°R
Fully Insulated: TLA = TB	TLA	511.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	514.81	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	515.48	°R
Fully Insulated; Tv = TB	Tv	511.28	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.230E-04	
Partially Insulated	Wv	1.235E-04	
Fully Insulated	Wv	1.159E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0001	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	0.0052	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0412	per day
Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Average Daily Vapor Pressure Range	ΔPv	0.0021	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	0.0052	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	23.18	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	21.33	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00206	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00635	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00429	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00190	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00628	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0043797	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	10.02	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00045	0.000004	0.005	0.00067
benzene	0.0000	0.0000	0.0000	78.11	130	0.00216	0.000019	0.005	0.00360
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.005	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02392	0.000176	0.005	0.03375
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00297	0.000019	0.005	0.00364
xylenes	0.0002	0.0001	0.0001	106.17	130	0.05759	0.000369	0.005	0.07051
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.71E-04	1.97E-06	0.005	3.76E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.005	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	188	86.18	0.00000	6.878	1171.5	224.37	1.6132
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.2702
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0826
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0718
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0018
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) — NOVEMBER

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		1.09E-06	ton/month
Time Period		November	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	534.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	1.96	ft
Diameter	D	3.61	ft
Throughput	Q	125	gal/month
Turnovers	N	10.14	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	0.96	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	0.98	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)		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}	0.0035339	
Partially Insulated	P_{VA}	0.0035455	
Fully Insulated	P_{VA}	0.0033895	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	499.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	501.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	502.00	°R
Fully Insulated: TLA = TB	TLA	500.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	502.87	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	503.27	°R
Fully Insulated; Tv = TB	Tv	500.73	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	8.513E-05	
Partially Insulated	Wv	8.535E-05	
Fully Insulated	Wv	8.201E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.029	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0001	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	0.0035	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0295	per day
Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0011	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	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.83	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.31	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00105	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00410	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00304	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00096	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00406	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0030936	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	10.02	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00048	0.000003	0.004	0.00073
benzene	0.0000	0.0000	0.0000	78.11	130	0.00229	0.000013	0.004	0.00382
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.004	-
toluene	0.0001	0.0000	0.0000	92.14	130	0.02438	0.000122	0.004	0.03440
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00289	0.000012	0.004	0.00354
xylenes	0.0001	0.0000	0.0001	106.17	130	0.05584	0.000242	0.004	0.06837
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.18E-04	1.14E-06	0.004	3.22E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.004	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	188	86.18	0.00000	6.878	1171.5	224.37	1.1808
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1862
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0543
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0470
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0010
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) — DECEMBER

Tank No.	R-Fire Pump		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.00	lb/month
		7.08E-07	ton/month
Time Period		December	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	422.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	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	1.96	ft
Diameter	D	3.61	ft
Throughput	Q	125	gal/month
Turnovers	N	9.81	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	0.96	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	0.98	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)		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}	0.002340269	
Partially Insulated	P_{VA}	0.002346638	
Fully Insulated	P_{VA}	0.002260914	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	488.85	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	490.51	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	490.59	°R
Fully Insulated: TLA = TB	TLA	489.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	491.27	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	491.59	°R
Fully Insulated; Tv = TB	Tv	489.58	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	5.771E-05	
Partially Insulated	Wv	5.783E-05	
Fully Insulated	Wv	5.594E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	10.0	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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	0.00	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	17	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	0.0001	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	0.0023	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0252	per day
Average Daily Vapor Temperature Range	ΔTv	14.35	°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	0.0023	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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	14.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	13.00	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00062	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00267	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00205	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00057	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 using	PVX	0.00264	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0020791	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.25	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	10.02	ft3
Effective Tank diameter	D_E	3.61	ft
Effective Tank Height	H_E	1.96	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	0.98	ft

HAPS Speciation	lb/month
Product	Diesel
Total HAP Emissions =	0.000

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)	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	130	0.00052	0.000002	0.002	0.00079
benzene	0.0000	0.0000	0.0000	78.11	130	0.00243	0.000009	0.002	0.00404
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0000	0.0000	0.0000	92.14	130	0.02478	0.000082	0.002	0.03496
ethylbenzene	0.0000	0.0000	0.0000	106.17	130	0.00279	0.000008	0.002	0.00342
xylenes	0.0001	0.0000	0.0001	106.17	130	0.05376	0.000154	0.002	0.06583
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.68E-04	6.37E-07	0.002	2.72E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	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	188	86.18	0.00000	6.878	1171.5	224.37	0.8475
benzene	0.00001	188	78.11	0.00002	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	188	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00032	188	92.14	0.00065	7.017	1377.6	222.64	0.1253
ethylbenzene	0.00013	188	106.17	0.00023	6.95	1419.3	212.61	0.0347
xylenes	0.00290	188	106.17	0.00514	7.009	1462.3	215.11	0.0300
naphthalene	0.00076	188	128.17	0.00111	7.146	1831.6	211.82	0.0006
cumene	0.00000	188	120.19	0.00000	6.929	1455.8	207.2	0.0148

HT TANK EMISSION CALCULATION

Tank No.		GAFO	Tank type	Horizontal Fixed Roof Tank			
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**	**ROUTINE EMISSIONS CALCULATIONS**	**Symbol**		**Units**
				Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.16**	lb/yr
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.38**	lb/year	Vapor Space Volume	Vv	60.3	ft3
		0.00	ton/year	Stock Vapor Density	Wv	0.0002	lb/ft3
Time Period		**Annual**		Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.047	per day
Nearest US Location		Albany, NY		Vented Vapor Saturation Factor	Ks	1.00	NA
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**1180.0**	Btu/ft^2-day	Constant; Number of Daily Events in a Year	365	365	days/year
Absolute Pressure	P_A	14.55	psi				
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R	**Working Losses;** Eq.1-35, Lw = VQ * KN * Kp * Wv * KB	**Lw**	**0.22**	lb/yr
Product Information				Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	1,444	ft3/yr
Product Type		Jet Kerosene		Working Loss Turnover Factor	KN	1.0000	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole	Working Loss Product Factor	Kp	1.00	
Average organic liquid density	WL	**7.00**	lb/gal	Stock Vapor Density	Wv	0.0002	lb/ft3
Average Reid Vapor Pressure	RVP	**0.03**		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	**12.39**		**Vented Vapor Saturation Factor;** Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure Equation Constant B	B	**8933.0**	°R	Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0066	psia
				Vapor Space Outage	Hvo	0.00	ft
Tank design data							
Effective Height H_E = (Pi)D/4	H_E	**3.14**	ft	**Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]**	**KE**	**0.0471**	**per day**
Effective Diameter D_E = SQRT(LD/(Pi/4))	D_E	**6.99**	ft	Average Daily Vapor Temperature Range	ΔTv	26.15	°R
Throughput	Q	**10,800**	gal/yr	Average Daily Vapor Pressure Range	ΔPv	0.0029	psi
Turnovers	N	**11.97**	per year	Breather Vent Pressure Setting Range (Equation 1-10: ΔPB = PBP - PBV)	ΔPB	0.0600	psi
				Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0066	psia
Tank Cone Roof Slope (If unknown, use 0.0625)	SR	**0.0625**	ft/ft	Average Daily Liquid Surface Temperature	TLA	512.85	°R
Dome Roof Radius (If unknown, use tank diameter (D) or (2Rs))	RR	**NA**	ft	Atmospheric Pressure	P_A	14.55	psia
Maximum Filling Height -use (Pi/4)D if unknown	HLX	**3.14**	ft				
Minimum Filling Height (use 0 if unknown)	HLN	**0.00**	ft	**Average Daily Vapor Temperature Range (ΔTv)**			
Liquid height (assume 1/2 H_E)	HL	**1.57**	ft	Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.8	°R
Tank Insulation (pick from drop down list)		Not Insulated		**Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)**	**ΔTv**	**26.15**	**°R**
Tank Construction (pick from drop down list)		Welded		**Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)**	**ΔTv**	**24.37**	°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	**0.00292**	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[A	PVX	0.00816	psia
	PBV	-0.03		Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00523	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	519.39	°R
Not Insulated	P_{VA}	0.00655049		Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	506.32	°R
Partially Insulated	P_{VA}	0.00659631					
Fully Insulated	P_{VA}	0.00599401		**Partially Insulated - Equation 1-9: ΔPV = PVX - PVN**	**ΔPv**	**0.00274**	**psia**
				Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00809	psia
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**508.20**	°R	Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0053510	psia
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.10	°R	Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	519.15	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	499.30	°R	Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.97	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.25	°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**	**60.32**	ft3
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**512.85**	°R	Effective Tank diameter	D_E	6.99	ft
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.06**	°R	Effective Tank Height	H_E	3.14	ft
Fully Insulated: TLA = TB	**TLA**	**510.3**		Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft
Average Vapor Temperature (Tv)							
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.98**	**°R**				
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.87**	**°R**				
Fully Insulated; Tv = TB	**Tv**	**510.25**	**°R**				
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)							
Not Insulated	Wv	1.541E-04					
Partially Insulated	Wv	1.549E-04					
Fully Insulated	Wv	1.423E-04					

HAPS Speciation	**lb/yr**						
Product	Jet A						
Total HAP Emissions =	**0.058**	**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	0.0058	86.18	130	0.01519	0.000150	0.007	**0.02292**
benzene	0.0028	78.11	130	0.00735	0.000080	0.007	**0.01224**
2,2,4 TMP	0.0000	114.23	130	0.00000	0.000000	0.007	-
toluene	0.0258	92.14	130	0.06755	0.000624	0.007	**0.09531**
ethylbenzene	0.0075	106.17	130	0.01968	0.000158	0.007	**0.02410**
xylenes	0.0160	106.17	130	0.04176	0.000335	0.007	**0.05113**
naphthalene	0.0001	128.17	130	2.64E-04	1.75E-06	0.007	**2.67E-04**
cumene	0.0000	120.19	130	0.00E+00	0.00E+00	0.007	**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	0.0000500	162	86.18	0.00009	6.878	1171.5	224.37	1.5971
benzene	0.0000400	162	78.11	0.00008	6.906	1211	220.79	0.9663
2,2,4 TMP	0.0000000	162	114.23	0.00000	6.812	1257.8	220.74	0.4913
toluene	0.0013300	162	92.14	0.00234	7.017	1377.6	222.64	0.2670
ethylbenzene	0.0012700	162	106.17	0.00194	6.95	1419.3	212.61	0.0815
xylenes	0.0031000	162	106.17	0.00473	7.009	1462.3	215.11	0.0708
naphthalene	0.0007967	162	128.17	0.00101	7.146	1831.6	211.82	0.0017
cumene	0.0000000	162	120.19	0.00000	6.929	1455.8	207.2	0.0372

Monthly Calculations - JANUARY

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	GAFO		
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.01	lb/month
		5.37E-06	ton/month
Time Period		January	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	532.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	11.74	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.00244101	
Partially Insulated	P_{VA}	0.00244959	
Fully Insulated	P_{VA}	0.0023346	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	483.25	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	490.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	475.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	484.18	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	485.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	485.44	°R
Fully Insulated: TLA = TB	TLA	484.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	486.30	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	486.71	°R
Fully Insulated; Tv = TB	Tv	484.18	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.081E-05	
Partially Insulated	Wv	6.097E-05	
Fully Insulated	Wv	5.841E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	60.3	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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	0.01	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0001	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	0.0024	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0301	per day
Average Daily Vapor Temperature Range	ΔTv	16.60	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	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	0.0024	psia
Average Daily Liquid Surface Temperature	TLA	485.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	14.9	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	16.60	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	15.11	°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[A	PVX	0.00285	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00208	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	489.50	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	481.20	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00070	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00282	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0021204	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	489.22	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	481.66	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.002
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	0.0002	0.0001	0.0001	86.18	130	0.01849	0.000068	0.002	0.02790
benzene	0.0001	0.0000	0.0001	78.11	130	0.00849	0.000034	0.002	0.01413
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.002	-
toluene	0.0008	0.0002	0.0005	92.14	130	0.07055	0.000243	0.002	0.09954
ethylbenzene	0.0002	0.0001	0.0001	106.17	130	0.01822	0.000054	0.002	0.02231
xylenes	0.0004	0.0001	0.0003	106.17	130	0.03837	0.000115	0.002	0.04698
naphthalene	0.0000	0.0000	0.0000	128.17	130	1.77E-04	4.39E-07	0.002	1.80E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.002	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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	0.7246
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.4158
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.2040
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.1039
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0281
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0242
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0004
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0117

Monthly Calculations (continued) FEBRUARY

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	GAFO		
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.01	lb/month
		6.34E-06	ton/month
Time Period		February	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	789.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	13.00	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.00279147	
Partially Insulated	P_{VA}	0.00280582	
Fully Insulated	P_{VA}	0.00261522	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	485.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	493.80	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	477.80	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	487.17	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	488.91	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	489.05	°R
Fully Insulated: TLA = TB	TLA	487.2	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	490.33	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	490.93	°R
Fully Insulated; Tv = TB	Tv	487.17	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	6.897E-05	
Partially Insulated	Wv	6.924E-05	
Fully Insulated	Wv	6.503E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.00	lb/month
Vapor Space Volume	Vv	60.3	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	0.01	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0001	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	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0376	per day
Average Daily Vapor Temperature Range	ΔTv	20.35	°R
Average Daily Vapor Pressure Range	ΔPv	0.0011	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	488.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	16.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	20.35	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	18.75	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00107	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00337	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00230	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.00	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	483.82	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00099	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00334	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0023511	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.74	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	484.36	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.002
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	0.0002	0.0001	0.0001	86.18	130	0.01803	0.000076	0.003	0.02719
benzene	0.0001	0.0000	0.0001	78.11	130	0.00834	0.000039	0.003	0.01388
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.003	-
toluene	0.0009	0.0003	0.0006	92.14	130	0.07023	0.000277	0.003	0.09909
ethylbenzene	0.0002	0.0001	0.0002	106.17	130	0.01844	0.000063	0.003	0.02258
xylenes	0.0005	0.0002	0.0003	106.17	130	0.03889	0.000133	0.003	0.04761
naphthalene	0.0000	0.0000	0.0000	128.17	130	1.88E-04	5.31E-07	0.003	1.90E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.003	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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	0.8076
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.4669
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.2304
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.1183
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0325
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0281
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0005
naphthalene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0138

Monthly Calculations (continued) MARCH

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Tank No.	GAFO		
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.02	lb/month
		1.01E-05	ton/month
Time Period		March	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1096.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	11.74	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.00405662	
Partially Insulated	P_{VA}	0.00408444	
Fully Insulated	P_{VA}	0.00371847	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	494.80	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	503.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	486.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	496.71	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	499.12	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	499.31	°R
Fully Insulated: TLA = TB	TLA	496.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	501.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	501.92	°R
Fully Insulated; Tv = TB	Tv	496.71	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	9.807E-05	
Partially Insulated	Wv	9.858E-05	
Fully Insulated	Wv	9.069E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	Ls	0.01	lb/month
Vapor Space Volume	Vv	60.3	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	0.01	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0001	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	0.0041	psia
Vapor Space Outage	Hvo	0.00	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	24.89	°R
Average Daily Vapor Pressure Range	ΔPv	0.0018	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	0.0041	psia
Average Daily Liquid Surface Temperature	TLA	499.12	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	17.4	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	24.89	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	23.15	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00182	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00506	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00324	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	505.35	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	492.90	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00170	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00501	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0033113	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.10	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	493.52	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.003
Eq. 40-2 L_{Ti} =Z_{Vi}(L_T)	

Individual HAPS	L_{Ti} (lb/month)	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	0.0003	0.0001	0.0002	86.18	130	0.01675	0.000103	0.004	0.02527
benzene	0.0002	0.0001	0.0001	78.11	130	0.00791	0.000053	0.004	0.01316
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.004	-
toluene	0.0014	0.0006	0.0008	92.14	130	0.06919	0.000396	0.004	0.09762
ethylbenzene	0.0004	0.0002	0.0002	106.17	130	0.01903	0.000095	0.004	0.02331
xylenes	0.0008	0.0003	0.0005	106.17	130	0.04024	0.000200	0.004	0.04927
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.19E-04	9.00E-07	0.004	2.22E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.004	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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	1.0907
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.6434
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.3220
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.1694
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0488
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0423
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0009
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0214

Monthly Calculations (continued) APRIL

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.04	lb/month
		1.75E-05	ton/month
Time Period		April	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1496.0	Btu/ft²-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	12.13	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.00666173	
Partially Insulated	P_{VA}	0.00672075	
Fully Insulated	P_{VA}	0.00595297	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	507.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	517.50	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	497.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	510.05	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	513.35	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	513.61	°R
Fully Insulated: TLA = TB	TLA	510.1	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	516.04	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	517.17	°R
Fully Insulated; Tv = TB	Tv	510.05	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.564E-04	
Partially Insulated	Wv	1.574E-04	
Fully Insulated	Wv	1.414E-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	60.3	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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	0.02	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0067	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0573	per day
Average Daily Vapor Temperature Range	ΔTv	31.42	°R
Average Daily Vapor Pressure Range	ΔPv	0.0036	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	0.0067	psia
Average Daily Liquid Surface Temperature	TLA	513.35	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	20.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	31.42	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	29.41	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00358	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00866	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00508	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	521.21	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	505.49	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00337	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00859	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0052204	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	520.96	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	506.26	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.005

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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0005	0.0002	0.0003	86.18	130	0.01514	0.000152	0.007	0.02284
benzene	0.0003	0.0001	0.0001	78.11	130	0.00733	0.000081	0.007	0.01221
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.007	-
toluene	0.0024	0.0011	0.0013	92.14	130	0.06749	0.000634	0.007	0.09522
ethylbenzene	0.0007	0.0003	0.0004	106.17	130	0.01970	0.000161	0.007	0.02412
xylenes	0.0015	0.0007	0.0008	106.17	130	0.04181	0.000341	0.007	0.05119
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.65E-04	1.79E-06	0.007	2.69E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.007	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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	1.6185
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.9801
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.4994
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.2713
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0829
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0721
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0018
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0380

Monthly Calculations (continued) MAY

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.05	lb/month
		2.65E-05	ton/month
Time Period		May	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1739.0	Btu/ft²-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	11.74	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.00972491	
Partially Insulated	P_{VA}	0.00982078	
Fully Insulated	P_{VA}	0.00858007	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	517.90	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	528.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	507.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	520.93	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	524.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	525.06	°R
Fully Insulated: TLA = TB	TLA	520.9	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	527.89	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	529.20	°R
Fully Insulated; Tv = TB	Tv	520.93	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.232E-04	
Partially Insulated	Wv	2.248E-04	
Fully Insulated	Wv	1.995E-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	60.3	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.063	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	120	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0097	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0627	per day
Average Daily Vapor Temperature Range	ΔTv	34.87	°R
Average Daily Vapor Pressure Range	ΔPv	0.0055	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	0.0097	psia
Average Daily Liquid Surface Temperature	TLA	524.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	21.0	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	34.87	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	32.77	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00555	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01284	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00729	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	533.48	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	516.04	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00526	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01275	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0074993	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	533.25	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	516.87	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.008

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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0007	0.0004	0.0004	86.18	130	0.01397	0.000205	0.010	0.02107
benzene	0.0004	0.0002	0.0002	78.11	130	0.00690	0.000112	0.010	0.01148
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.010	-
toluene	0.0035	0.0017	0.0018	92.14	130	0.06596	0.000905	0.010	0.09306
ethylbenzene	0.0011	0.0005	0.0005	106.17	130	0.02012	0.000240	0.010	0.02463
xylenes	0.0023	0.0011	0.0011	106.17	130	0.04283	0.000510	0.010	0.05244
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.05E-04	3.01E-06	0.010	3.10E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.010	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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	2.1802
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	1.3462
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.6951
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.3870
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.1236
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.1078
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0030
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0584

Monthly Calculations (continued) JUNE

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.07	lb/month
		3.51E-05	ton/month
Time Period		June	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1853.0	Btu/ft²-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	12.13	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 H_E)	HL	1.57	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)		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}	0.01336996	
Partially Insulated	P_{VA}	0.01350521	
Fully Insulated	P_{VA}	0.01175704	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	527.45	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	537.30	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	517.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	530.67	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	534.76	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	535.08	°R
Fully Insulated: TLA = TB	TLA	530.7	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	538.09	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	539.49	°R
Fully Insulated; Tv = TB	Tv	530.67	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.010E-04	
Partially Insulated	Wv	3.033E-04	
Fully Insulated	Wv	2.684E-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	60.3	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	0.04	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0134	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0624	per day
Average Daily Vapor Temperature Range	ΔTv	35.28	°R
Average Daily Vapor Pressure Range	ΔPv	0.0074	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	0.0134	psia
Average Daily Liquid Surface Temperature	TLA	534.76	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.7	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.28	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.31	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00743	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01753	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.01010	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	543.58	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	525.94	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00707	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01744	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0103720	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	543.41	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	526.75	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.010

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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0009	0.0004	0.0005	86.18	130	0.01303	0.000263	0.013	0.01965
benzene	0.0005	0.0002	0.0002	78.11	130	0.00654	0.000146	0.013	0.01088
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.013	-
toluene	0.0045	0.0022	0.0023	92.14	130	0.06454	0.001217	0.013	0.09105
ethylbenzene	0.0014	0.0007	0.0007	106.17	130	0.02040	0.000334	0.013	0.02498
xylenes	0.0031	0.0015	0.0016	106.17	130	0.04355	0.000713	0.013	0.05333
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.42E-04	4.64E-06	0.013	3.47E-04
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.013	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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	2.7955
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	1.7540
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.9152
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.5206
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.1723
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.1507
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0046
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0835

Monthly Calculations (continued) — JULY

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.08	lb/month
		3.99E-05	ton/month
Time Period		July	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1872.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	11.74	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.0151237	
Partially Insulated	P_{VA}	0.01527599	
Fully Insulated	P_{VA}	0.01330704	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	531.35	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	541.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	521.70	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	534.61	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	538.73	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	539.06	°R
Fully Insulated: TLA = TB	TLA	534.6	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	542.10	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	543.51	°R
Fully Insulated; Tv = TB	Tv	534.61	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.380E-04	
Partially Insulated	Wv	3.405E-04	
Fully Insulated	Wv	3.015E-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	60.3	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.062	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	120	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0151	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0618	per day
Average Daily Vapor Temperature Range	ΔTv	35.23	°R
Average Daily Vapor Pressure Range	ΔPv	0.0083	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	0.0151	psia
Average Daily Liquid Surface Temperature	TLA	538.73	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	35.23	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	33.30	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00826	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01975	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.01148	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	547.54	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	529.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00787	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01965	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0117798	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	547.38	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	530.74	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.012

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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0010	0.0005	0.0005	86.18	130	0.01267	0.000289	0.015	**0.01912**
benzene	0.0005	0.0003	0.0003	78.11	130	0.00640	0.000161	0.015	**0.01065**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.015	-
toluene	0.0051	0.0025	0.0026	92.14	130	0.06395	0.001365	0.015	**0.09023**
ethylbenzene	0.0016	0.0008	0.0008	106.17	130	0.02049	0.000379	0.015	**0.02509**
xylenes	0.0035	0.0017	0.0018	106.17	130	0.04380	0.000811	0.015	**0.05363**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.57E-04	5.48E-06	0.015	**3.62E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.015	**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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	3.0764
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	1.9422
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	1.0173
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.5836
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.1958
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.1715
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0054
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0958

Monthly Calculations (continued) — AUGUST

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.07	lb/month
		3.60E-05	ton/month
Time Period		August	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1640.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	11.74	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.01416691	
Partially Insulated	P_{VA}	0.01429281	
Fully Insulated	P_{VA}	0.01265457	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	530.15	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	539.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	520.60	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	533.00	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	536.62	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	536.90	°R
Fully Insulated: TLA = TB	TLA	533.0	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	539.57	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	540.80	°R
Fully Insulated; Tv = TB	Tv	533.00	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	3.181E-04	
Partially Insulated	Wv	3.202E-04	
Fully Insulated	Wv	2.876E-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	60.3	ft3
Stock Vapor Density	Wv	0.0003	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.057	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	120	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	0.0003	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0142	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0567	per day
Average Daily Vapor Temperature Range	ΔTv	32.39	°R
Average Daily Vapor Pressure Range	ΔPv	0.0072	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	0.0142	psia
Average Daily Liquid Surface Temperature	TLA	536.62	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.1	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	32.39	°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	0.00717	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01815	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.01098	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	544.72	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	528.52	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00679	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01804	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0112480	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	544.52	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	529.28	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.011

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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0009	0.0004	0.0005	86.18	130	0.01286	0.000275	0.014	**0.01940**
benzene	0.0005	0.0002	0.0002	78.11	130	0.00647	0.000153	0.014	**0.01078**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.014	-
toluene	0.0046	0.0022	0.0025	92.14	130	0.06427	0.001285	0.014	**0.09067**
ethylbenzene	0.0015	0.0007	0.0008	106.17	130	0.02044	0.000355	0.014	**0.02503**
xylenes	0.0031	0.0015	0.0017	106.17	130	0.04367	0.000758	0.014	**0.05347**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.49E-04	5.02E-06	0.014	**3.54E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.014	**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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	2.9242
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	1.8401
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.9609
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.5493
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.1830
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.1602
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0050
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0890

Monthly Calculations (continued) — SEPTEMBER

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Total Losses (Eq.1-1: LT = LS+LW)	LT	0.05	lb/month
		2.54E-05	ton/month
Time Period		September	
Nearest US Location		Albany, NY	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	1300.0	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		Jet Kerosene	
Vapor Molecular weight	Mv	130	Lb/lb-mole
Average organic liquid density	WL	7.00	lb/gal
Average Reid Vapor Pressure	RVP	0.03	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	1.00	
Vapor Pressure Equation Constant A	A	12.39	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	8933.0	°R
Tank design data			
Shell height	Hs	3.14	ft
Diameter	D	6.99	ft
Throughput	Q	900	gal/month
Turnovers	N	12.13	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	2.14	ft
Minimum Filling Height (use 0 if unknown)	HLN	1.00	ft
Liquid height (assume 1/2 $H_{E)}$	HL	1.57	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)		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}	0.01051485	
Partially Insulated	P_{VA}	0.01059155	
Fully Insulated	P_{VA}	0.00958491	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	TAA	522.05	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	531.70	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	512.40	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	524.31	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	TLA	527.18	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	TLA	527.40	°R
Fully Insulated: TLA = TB	TLA	524.3	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	Tv	529.51	°R
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	Tv	530.49	°R
Fully Insulated; Tv = TB	Tv	524.31	°R
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	2.406E-04	
Partially Insulated	Wv	2.419E-04	
Fully Insulated	Wv	2.215E-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	60.3	ft3
Stock Vapor Density	Wv	0.0002	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	30	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	120	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	Ks	1.00	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0105	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	KE	0.0504	per day
Average Daily Vapor Temperature Range	ΔTv	28.59	°R
Average Daily Vapor Pressure Range	ΔPv	0.0049	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	0.0105	psia
Average Daily Liquid Surface Temperature	TLA	527.18	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	19.3	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	ΔTv	28.59	°R
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	ΔTv	26.66	°R
Fully Insulated, constant temperature	ΔTv	0.00	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00486	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.01319	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00833	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	534.32	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	520.03	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	0.00456	psia
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.01308	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0085273	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	534.07	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	520.74	°R
Fully Insulated (ΔPv = 0)	ΔPv	0.00	psia
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	Vv	60.32	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	0.008

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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0007	0.0003	0.0004	86.18	130	0.01373	0.000218	0.011	**0.02072**
benzene	0.0003	0.0001	0.0002	78.11	130	0.00681	0.000119	0.011	**0.01134**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.011	-
toluene	0.0033	0.0014	0.0019	92.14	130	0.06562	0.000974	0.011	**0.09259**
ethylbenzene	0.0010	0.0004	0.0006	106.17	130	0.02019	0.000260	0.011	**0.02472**
xylenes	0.0022	0.0009	0.0012	106.17	130	0.04302	0.000554	0.011	**0.05267**
naphthalene	0.0000	0.0000	0.0000	128.17	130	3.14E-04	3.35E-06	0.011	**3.19E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.011	**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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	2.3177
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	1.4368
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.7421
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.4163
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.1341
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.1171
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0033
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0636

Monthly Calculations (continued) OCTOBER

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.03**	lb/month
		1.54E-05	ton/month
Time Period		**October**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**882.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Jet Kerosene**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.00**	lb/gal
Average Reid Vapor Pressure	RVP	**0.03**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.39**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8933.0**	°R
Tank design data			
Shell height	Hs	**3.14**	ft
Diameter	D	**6.99**	ft
Throughput	Q	**900**	gal/month
Turnovers	N	**11.74**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.00663432	
Partially Insulated	P_{VA}	0.00666893	
Fully Insulated	P_{VA}	0.0062095	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**509.75**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	519.00	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	500.50	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	511.28	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**513.23**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**513.38**	°R
Fully Insulated: TLA = TB	**TLA**	**511.3**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**514.81**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**515.48**	**°R**
Fully Insulated; Tv = TB	**Tv**	**511.28**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.561E-04	
Partially Insulated	Wv	1.567E-04	
Fully Insulated	Wv	1.471E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	60.3	ft3
Stock Vapor Density	Wv	0.0002	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.041	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**	**0.02**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0002	lb/ft3
Vent Setting Correction Factor	KB	1.00	
Vented Vapor Saturation Factor; Eq. 1-21, Ks = 1/(1+0.053*PvA*Hvo))	**Ks**	**1.00**	
Vapor Pressure at Avg Daily Liq Surface Temp	PvA	0.0066	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0412**	**per day**
Average Daily Vapor Temperature Range	ΔTv	23.18	°R
Average Daily Vapor Pressure Range	ΔPv	0.0026	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	0.0066	psia
Average Daily Liquid Surface Temperature	TLA	513.23	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	18.5	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**23.18**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**21.33**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00262**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00806	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00544	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	519.02	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	507.43	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00242**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00798	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0055556	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	518.71	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	508.05	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**60.32**	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	**0.005**
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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0005	0.0002	0.0003	86.18	130	0.01515	0.000152	0.007	**0.02285**
benzene	0.0002	0.0001	0.0001	78.11	130	0.00734	0.000081	0.007	**0.01221**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.007	**-**
toluene	0.0021	0.0008	0.0013	92.14	130	0.06750	0.000632	0.007	**0.09524**
ethylbenzene	0.0006	0.0002	0.0004	106.17	130	0.01970	0.000160	0.007	**0.02412**
xylenes	0.0013	0.0005	0.0008	106.17	130	0.04180	0.000340	0.007	**0.05118**
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.65E-04	1.78E-06	0.007	**2.69E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.007	**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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	1.6132
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.9767
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.4960
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.2702
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0826
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0718
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0018
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0377

Monthly Calculations (continued) NOVEMBER

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.02**	lb/month
		9.37E-06	ton/month
Time Period		**November**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**534.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Jet Kerosene**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.00**	lb/gal
Average Reid Vapor Pressure	RVP	**0.03**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.39**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8933.0**	°R
Tank design data			
Shell height	Hs	**3.14**	ft
Diameter	D	**6.99**	ft
Throughput	Q	**900**	gal/month
Turnovers	N	**12.13**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.00447992	
Partially Insulated	P_{VA}	0.0044947	
Fully Insulated	P_{VA}	0.00429638	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**499.80**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	507.40	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	492.20	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	500.73	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**501.91**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**502.00**	°R
Fully Insulated: TLA = TB	**TLA**	**500.7**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**502.87**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**503.27**	**°R**
Fully Insulated; Tv = TB	**Tv**	**500.73**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	1.079E-04	
Partially Insulated	Wv	1.082E-04	
Fully Insulated	Wv	1.039E-04	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.01**	lb/month
Vapor Space Volume	Vv	60.3	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.030	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0001	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	0.0045	psia
Vapor Space Outage	Hvo	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0295**	**per day**
Average Daily Vapor Temperature Range	ΔTv	16.83	°R
Average Daily Vapor Pressure Range	ΔPv	0.0013	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	0.0045	psia
Average Daily Liquid Surface Temperature	TLA	501.91	°R
Atmospheric Pressure	P_A	14.55	psia
Average Daily Vapor Temperature Range (ΔTv)			
Average daily ambient temperature range - Equation 1-11 (ΔTA=TAX-TAN)	ΔTA	15.2	°R
Not Insulated - Equation 1-7 (ΔTV = 0.7 ΔTA + 0.02 α I)	**ΔTv**	**16.83**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**15.31**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00134**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00519	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00385	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	506.11	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	497.70	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00122**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00514	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0039202	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	505.83	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	498.17	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**60.32**	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	**0.003**
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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0003	0.0001	0.0002	86.18	130	0.01642	0.000111	0.004	**0.02477**
benzene	0.0001	0.0000	0.0001	78.11	130	0.00779	0.000058	0.004	**0.01297**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.004	**-**
toluene	0.0013	0.0004	0.0009	92.14	130	0.06888	0.000435	0.004	**0.09718**
ethylbenzene	0.0004	0.0001	0.0002	106.17	130	0.01918	0.000105	0.004	**0.02348**
xylenes	0.0008	0.0002	0.0005	106.17	130	0.04057	0.000223	0.004	**0.04968**
naphthalene	0.0000	0.0000	0.0000	128.17	130	2.28E-04	1.03E-06	0.004	**2.31E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.004	**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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	1.1808
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.7003
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.3505
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.1862
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0543
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0470
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0010
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0239

Monthly Calculations (continued) DECEMBER

Tank No.	GAFO		
ROUTINE EMISSIONS CALCULATIONS	**Symbol**		**Units**
Total Losses (Eq.1-1: LT = LS+LW)	**LT**	**0.01**	lb/month
		6.11E-06	ton/month
Time Period		**December**	
Nearest US Location		**Albany, NY**	
Daily total solar insolation on a horizontal surface; Table 7.1-7	I	**422.0**	Btu/ft^2-day
Absolute Pressure	P_A	14.55	psi
Ideal Gas Constant	R	10.73	piai ft3/lb-mole R
Product Information			
Product Type		**Jet Kerosene**	
Vapor Molecular weight	Mv	**130**	Lb/lb-mole
Average organic liquid density	WL	**7.00**	lb/gal
Average Reid Vapor Pressure	RVP	**0.03**	
Product factor; 0.4 for crude oils or 1 for other organic liquids	Kc	**1.00**	
Vapor Pressure Equation Constant A	A	**12.39**	
Vapor Pressure Equation Constant B (Table 7.1-2)	B	**8933.0**	°R
Tank design data			
Shell height	Hs	**3.14**	ft
Diameter	D	**6.99**	ft
Throughput	Q	**900**	gal/month
Turnovers	N	**11.74**	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	**2.14**	ft
Minimum Filling Height (use 0 if unknown)	HLN	**1.00**	ft
Liquid height (assume 1/2 H_E)	HL	**1.57**	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)		**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}	0.002963172	
Partially Insulated	P_{VA}	0.00297126	
Fully Insulated	P_{VA}	0.002862407	
Average Daily Ambient Temperature (TAA); Eq. 1-30 TAA = ((TAX+TAN	**TAA**	**488.85**	°R
Average daily maximum ambient temperature, Table 7.1-7	TAX	495.60	°R
Average daily minimum ambient temperature, Table 7.1-7	TAN	482.10	°R
Liquid Bulk Temperature; Eq 1-31: TB = TAA + 0.003 αs I	TB	489.58	°R
Average Daily Liquid Surface Temperature (TLA)			
Not Insulated: Eq. 1-28, TLA = 0.4*TAA + 0.6*TB + 0.005*α*I	**TLA**	**490.51**	°R
Partially Insulated: Eq. 1-29, TLA = 0.3*TAA + 0.7*TB + 0.005*αR*I	**TLA**	**490.59**	°R
Fully Insulated: TLA = TB	**TLA**	**489.6**	
Average Vapor Temperature (Tv)			
Not Insulated; Eq. 1-33, Tv = 0.7*TAA + 0.3*TB + 0.009*α*I	**Tv**	**491.27**	**°R**
Partially Insulated; Eq. 1-34, Tv = 0.6*TAA + 0.4*TB + 0.01*αR*I	**Tv**	**491.59**	**°R**
Fully Insulated; Tv = TB	**Tv**	**489.58**	**°R**
Stock Vapor Density; Eq. 1-22, Wv = (Mv*PVA)/(R*Tv)			
Not Insulated	Wv	7.307E-05	
Partially Insulated	Wv	7.322E-05	
Fully Insulated	Wv	7.083E-05	

ROUTINE EMISSIONS CALCULATIONS	Symbol		Units
Standing Losses; Eq.1-2, Ls = 365 (Vv * Wv * KE * Ks)	**Ls**	**0.00**	lb/month
Vapor Space Volume	Vv	60.3	ft3
Stock Vapor Density	Wv	0.0001	lb/ft3
Vapor Space Expansion Factor (0 < KE <= 1); Eq. 1-5	KE	0.025	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**	**0.01**	lb/month
Net Working Loss Throughput (Eq. 1-39: VQ=5.614*Q)	VQ	120	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	0.0001	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	0.00	ft
Vapor Space Expansion Factor (Eq. 1-5: (ΔTv/TLA)+[(ΔPv-ΔPB)/(PA-PvA)]	**KE**	**0.0252**	**per day**
Average Daily Vapor Temperature Range	ΔTv	14.35	°R
Average Daily Vapor Pressure Range	ΔPv	0.0008	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	0.0030	psia
Average Daily Liquid Surface Temperature	TLA	490.51	°R
Atmospheric Pressure	P_A	14.55	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**	**14.35**	**°R**
Partially Insulated - Equation 1-8 (ΔTV = 0.6 ΔTA + 0.02 αR I)	**ΔTv**	**13.00**	°R
Fully Insulated, constant temperature	**ΔTv**	**0.00**	°R
Average Daily Vapor Pressure Range (ΔPv)			
Not Insulated - Equation 1-9: ΔPV = PVX - PVN	ΔPv	**0.00079**	psia
Vapor pressure at ave. daily max liquid surface temp, (Eq. 1-25 PVX = exp[A	PVX	0.00338	psia
Vapor pressure at ave daily min liquid surface temp, (Eq. 1-25 PVN = exp[A	PVN	0.00259	psia
Average daily max. liquid surface temp.; Fig. 7.1-17 TLX = TLA + 0.25ΔTV	TLX	494.10	°R
Average daily min. liquid surface temp.; Fig. 7.1-17 TLN = TLA - 0.25ΔTV	TLN	486.93	°R
Partially Insulated - Equation 1-9: ΔPV = PVX - PVN	**ΔPv**	**0.00072**	**psia**
Vapor pressure at the average daily max liquid surface temp, (Eq. 1-25 usin	PVX	0.00335	psia
Vapor pressure at the average daily min liquid surface temp, (Eq. 1-25 using	PVN	0.0026316	psia
Average daily maximum liquid surface temperature, deg R (TLX = TLA + 0.2	TLX	493.84	°R
Average daily minimum liquid surface temperature, deg R (TLN = TLA - 0.2	TLN	487.34	°R
Fully Insulated (ΔPv = 0)	**ΔPv**	**0.00**	**psia**
Vapor Space Volume (Eq.1-3: Vv = ((Pi / 4) D^2)Hvo	**Vv**	**60.32**	ft3
Effective Tank diameter	D_E	6.99	ft
Effective Tank Height	H_E	3.14	ft
Vapor Space Outage Hvo = 1/2 H_E	Hvo	1.57	ft

HAPS Speciation	lb/month
Product	Jet A
Total HAP Emissions =	**0.002**
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)	Standing, lb/yr	Working, lb/yr	M_i	M_V	Z_{Vi}	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.0002	0.0001	0.0002	86.18	130	0.01782	0.000080	0.003	**0.02688**
benzene	0.0001	0.0000	0.0001	78.11	130	0.00827	0.000041	0.003	**0.01376**
2,2,4 TMP	0.0000	0.0000	0.0000	114.23	130	0.00000	0.000000	0.003	**-**
toluene	0.0009	0.0002	0.0006	92.14	130	0.07008	0.000293	0.003	**0.09888**
ethylbenzene	0.0002	0.0001	0.0002	106.17	130	0.01854	0.000067	0.003	**0.02271**
xylenes	0.0005	0.0001	0.0003	106.17	130	0.03911	0.000142	0.003	**0.04789**
naphthalene	0.0000	0.0000	0.0000	128.17	130	1.92E-04	5.78E-07	0.003	**1.95E-04**
cumene	0.0000	0.0000	0.0000	120.19	130	0.00E+00	0.00E+00	0.003	**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	0.00005	162	86.18	0.00009	6.878	1171.5	224.37	0.8475
benzene	0.00004	162	78.11	0.00008	6.906	1211	220.79	0.4915
2,2,4 TMP	0.00000	162	114.23	0.00000	6.812	1257.8	220.74	0.2425
toluene	0.00133	162	92.14	0.00234	7.017	1377.6	222.64	0.1253
ethylbenzene	0.00127	162	106.17	0.00194	6.95	1419.3	212.61	0.0347
xylenes	0.00310	162	106.17	0.00473	7.009	1462.3	215.11	0.0300
naphthalene	0.00080	162	128.17	0.00101	7.146	1831.6	211.82	0.0006
cumene	0.00000	162	120.19	0.00000	6.929	1455.8	207.2	0.0148

NOTE - THIS SPREADSHEET IS USED TO ESTIMATE AVERAGE SPECIATION FOR LOADING CALCULATIONS

Nearest US Location		Albany, NY
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

Absolute Pressure P_A 14.55 psi

MONTH January

	Symbol		Units
Product Type		Crude RVP 12.5	
Vapor Molecular weight	M_v	50.00	
Vapor Pressure Equation Constant A	A	10.38	
Vapor Pressure Equation Constant B	B	4189.71	°R
Daily total solar insolation on a horizontal surface	I	532.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	483.25	°R
Average daily maximum ambient temp	T_{AX}	490.70	°R
Average daily minimum ambient tempe	T_{AN}	475.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	483.65	
Average Daily Liquid Surface Temperature Eq. 2-6			
TLA = 0.3*TAA + 0.7*TB + 0.004*α*I	T_{LA}	484.06	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.594	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$	P*	0.121	NA
HAPS Speciation			
Product - select from list		Crude Oil	

Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	50	0.00206
benzene	78.11	50	0.00177
2,2,4 TMP	114.23	50	0.00014
toluene	92.14	50	0.00073
ethylbenzene	106.17	50	0.00008
xylenes	106.17	50	0.00024
naphthalene	128.17	50	1.11E-07
cumene	120.19	50	0.00E+00

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.006691	5.594	0.0011959
benzene	0.006337	5.594	0.00113
2,2,4 TMP	0.000353	5.594	0.00006
toluene	0.002226	5.594	0.00040
ethylbenzene	0.000208	5.594	0.00004
xylenes	0.000627	5.594	0.00011
naphthalene	2.42E-07	5.594	0.00000
cumene	0.00E+00	5.594	-

Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$

	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000

Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**

	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.70
benzene	6.906	1211	220.79	0.40
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH February

	Symbol		Units
Product Type		Crude RVP 12.5	
Vapor Molecular weight	M_v	50.00	
Vapor Pressure Equation Constant A	A	10.38	
Vapor Pressure Equation Constant B	B	4189.71	°R
Daily total solar insolation on a horiz	I	789.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	485.80	°R
Average daily maximum	T_{AX}	493.80	°R
Average daily minimum	T_{AN}	477.80	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	486.39	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB	T_{LA}	487.00	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	5.895	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$	P*	0.129	NA
HAPS Speciation			
Product - select from list		Crude Oil	

Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	50	0.00214
benzene	78.11	50	0.00185
2,2,4 TMP	114.23	50	0.00015
toluene	92.14	50	0.00078
ethylbenzene	106.17	50	0.00008
xylenes	106.17	50	0.00026
naphthalene	128.17	50	1.23E-07
cumene	120.19	50	0.00E+00

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.007323	5.895	0.00124
benzene	0.006979	5.895	0.00118
2,2,4 TMP	0.000390	5.895	0.00007
toluene	0.002480	5.895	0.00042
ethylbenzene	0.000235	5.895	0.00004
xylenes	0.000709	5.895	0.00012
naphthalene	2.84E-07	5.895	0.00000
cumene	0.00E+00	5.895	-

Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$

	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000

Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**

	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.76
benzene	6.906	1211	220.79	0.44
2,2,4 TMP	6.812	1257.8	220.74	0.22
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH March

	Symbol		Units
Product Type		Crude RVP 12.5	
Vapor Molecular weight	M_v	50.00	
Vapor Pressure Equation Constant A	A	10.38	
Vapor Pressure Equation Constant B	B	4189.71	°R
Daily total solar insolation on a horiz	I	1096.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30			
TAA = ((TAX+TAN)/2)	T_{AA}	494.80	°R
Average daily maximum	T_{AX}	503.50	°R
Average daily minimum	T_{AN}	486.10	°R
Liquid Bulk Temperature Eq 1-31:			
TB = TAA + 0.003 αs I	T_B	495.62	
Average Daily Liquid Surface Temperature Eq. 1-28			
TLA = 0.3*TAA + 0.7*TB	T_{LA}	496.47	°R
True Vapor Pressure Eq. 1-25:			
PvA = exp(A-(B/TLA))	P_{VA}	6.946	psia
Vapor pressure function Eq. 2-4:			
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$	P*	0.161	NA
HAPS Speciation			
Product - select from list		Crude Oil	

Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$

	M_i	M_V	Z_{Vi}
hexane	86.18	50	0.00241
benzene	78.11	50	0.00212
2,2,4 TMP	114.23	50	0.00018
toluene	92.14	50	0.00092
ethylbenzene	106.17	50	0.00010
xylenes	106.17	50	0.00032
naphthalene	128.17	50	1.72E-07
cumene	120.19	50	0.00E+00

Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$

	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i
hexane	0.009707	6.946	0.00140
benzene	0.009428	6.946	0.00136
2,2,4 TMP	0.000533	6.946	0.00008
toluene	0.003472	6.946	0.00050
ethylbenzene	0.000343	6.946	0.00005
xylenes	0.001040	6.946	0.00015
naphthalene	4.65E-07	6.946	0.00000
cumene	0.00E+00	6.946	-

Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$

	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000

Component Vapor pressure P_{VAi}**=(0.019337)10^(A-(B/(TLA+C)))**

	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.01
benzene	6.906	1211	220.79	0.59
2,2,4 TMP	6.812	1257.8	220.74	0.29
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH April

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	508.57	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**509.73**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	8.651	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.222	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00281	
benzene	78.11	50	0.00254	
2,2,4 TMP	114.23	50	0.00021	
toluene	92.14	50	0.00116	
ethylbenzene	106.17	50	0.00014	
xylenes	106.17	50	0.00042	
naphthalene	128.17	50	2.65E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.014100	8.651	0.00163	
benzene	0.014041	8.651	0.00162	
2,2,4 TMP	0.000806	8.651	0.00009	
toluene	0.005422	8.651	0.00063	
ethylbenzene	0.000567	8.651	0.00007	
xylenes	0.001724	8.651	0.00020	
naphthalene	8.93E-07	8.651	0.00000	
cumene	0.00E+00	8.651	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH May

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	519.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**520.55**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	10.263	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.296	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00316	
benzene	78.11	50	0.00290	
2,2,4 TMP	114.23	50	0.00025	
toluene	92.14	50	0.00137	
ethylbenzene	106.17	50	0.00017	
xylenes	106.17	50	0.00053	
naphthalene	128.17	50	3.68E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.018802	10.263	0.00183	
benzene	0.019079	10.263	0.00186	
2,2,4 TMP	0.001108	10.263	0.00011	
toluene	0.007644	10.263	0.00074	
ethylbenzene	0.000834	10.263	0.00008	
xylenes	0.002544	10.263	0.00025	
naphthalene	1.48E-06	10.263	0.00000	
cumene	0.00E+00	10.263	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.96
benzene	6.906	1211	220.79	1.20
2,2,4 TMP	6.812	1257.8	220.74	0.61
toluene	7.017	1377.6	222.64	0.34
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.09
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.05

MONTH June

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.84	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**530.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	11.895	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.401	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00349	
benzene	78.11	50	0.00326	
2,2,4 TMP	114.23	50	0.00028	
toluene	92.14	50	0.00159	
ethylbenzene	106.17	50	0.00021	
xylenes	106.17	50	0.00063	
naphthalene	128.17	50	4.88E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.024059	11.895	0.00202	
benzene	0.024807	11.895	0.00209	
2,2,4 TMP	0.001456	11.895	0.00012	
toluene	0.010257	11.895	0.00086	
ethylbenzene	0.001160	11.895	0.00010	
xylenes	0.003547	11.895	0.00030	
naphthalene	2.26E-06	11.895	0.00000	
cumene	0.00E+00	11.895	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.56
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.46
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.07

MONTH July

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	532.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**534.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	12.607	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.465	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00362	
benzene	78.11	50	0.00341	
2,2,4 TMP	114.23	50	0.00029	
toluene	92.14	50	0.00168	
ethylbenzene	106.17	50	0.00022	
xylenes	106.17	50	0.00068	
naphthalene	128.17	50	5.44E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.026499	12.607	0.00210	
benzene	0.027493	12.607	0.00218	
2,2,4 TMP	0.001620	12.607	0.00013	
toluene	0.011510	12.607	0.00091	
ethylbenzene	0.001320	12.607	0.00010	
xylenes	0.004040	12.607	0.00032	
naphthalene	2.68E-06	12.607	0.00000	
cumene	0.00E+00	12.607	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.76
benzene	6.906	1211	220.79	1.73
2,2,4 TMP	6.812	1257.8	220.74	0.89
toluene	7.017	1377.6	222.64	0.51
ethylbenzene	6.95	1419.3	212.61	0.17
xylenes	7.009	1462.3	215.11	0.15
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH August

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**532.65**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	12.321	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.437	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00357	
benzene	78.11	50	0.00335	
2,2,4 TMP	114.23	50	0.00029	
toluene	92.14	50	0.00165	
ethylbenzene	106.17	50	0.00022	
xylenes	106.17	50	0.00066	
naphthalene	128.17	50	5.22E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.025511	12.321	0.00207	
benzene	0.026404	12.321	0.00214	
2,2,4 TMP	0.001553	12.321	0.00013	
toluene	0.011000	12.321	0.00089	
ethylbenzene	0.001255	12.321	0.00010	
xylenes	0.003839	12.321	0.00031	
naphthalene	2.51E-06	12.321	0.00000	
cumene	0.00E+00	12.321	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.66
benzene	6.906	1211	220.79	1.66
2,2,4 TMP	6.812	1257.8	220.74	0.86
toluene	7.017	1377.6	222.64	0.49
ethylbenzene	6.95	1419.3	212.61	0.16
xylenes	7.009	1462.3	215.11	0.14
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH September

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	523.03	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**524.03**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	10.826	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.328	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00327	
benzene	78.11	50	0.00303	
2,2,4 TMP	114.23	50	0.00026	
toluene	92.14	50	0.00145	
ethylbenzene	106.17	50	0.00018	
xylenes	106.17	50	0.00056	
naphthalene	128.17	50	4.08E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.020563	10.826	0.00190	
benzene	0.020987	10.826	0.00194	
2,2,4 TMP	0.001224	10.826	0.00011	
toluene	0.008505	10.826	0.00079	
ethylbenzene	0.000940	10.826	0.00009	
xylenes	0.002870	10.826	0.00027	
naphthalene	1.72E-06	10.826	0.00000	
cumene	0.00E+00	10.826	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.14
benzene	6.906	1211	220.79	1.32
2,2,4 TMP	6.812	1257.8	220.74	0.68
toluene	7.017	1377.6	222.64	0.38
ethylbenzene	6.95	1419.3	212.61	0.12
xylenes	7.009	1462.3	215.11	0.11
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.06

MONTH October

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	510.41	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**511.10**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	8.843	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.230	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00285	
benzene	78.11	50	0.00258	
2,2,4 TMP	114.23	50	0.00022	
toluene	92.14	50	0.00118	
ethylbenzene	106.17	50	0.00014	
xylenes	106.17	50	0.00044	
naphthalene	128.17	50	2.76E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.014633	8.843	0.00165	
benzene	0.014607	8.843	0.00165	
2,2,4 TMP	0.000840	8.843	0.00009	
toluene	0.005668	8.843	0.00064	
ethylbenzene	0.000596	8.843	0.00007	
xylenes	0.001813	8.843	0.00020	
naphthalene	9.53E-07	8.843	0.00000	
cumene	0.00E+00	8.843	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.52
benzene	6.906	1211	220.79	0.92
2,2,4 TMP	6.812	1257.8	220.74	0.46
toluene	7.017	1377.6	222.64	0.25
ethylbenzene	6.95	1419.3	212.61	0.08
xylenes	7.009	1462.3	215.11	0.07
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH November

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	500.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**500.61**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	7.448	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.177	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00253	
benzene	78.11	50	0.00225	
2,2,4 TMP	114.23	50	0.00019	
toluene	92.14	50	0.00099	
ethylbenzene	106.17	50	0.00011	
xylenes	106.17	50	0.00035	
naphthalene	128.17	50	1.97E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.010936	7.448	0.00147	
benzene	0.010707	7.448	0.00144	
2,2,4 TMP	0.000608	7.448	0.00008	
toluene	0.004003	7.448	0.00054	
ethylbenzene	0.000403	7.448	0.00005	
xylenes	0.001222	7.448	0.00016	
naphthalene	5.73E-07	7.448	0.00000	
cumene	0.00E+00	7.448	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.14
benzene	6.906	1211	220.79	0.67
2,2,4 TMP	6.812	1257.8	220.74	0.34
toluene	7.017	1377.6	222.64	0.18
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH December

		Symbol		Units
Product Type			Crude RVP 12.5	
Vapor Molecular weight		M_v	**50.00**	
Vapor Pressure Equation Constant A		A	10.38	
Vapor Pressure Equation Constant B		B	4189.71	°R
Daily total solar insolation on a horiz		I	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	489.17	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**489.49**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.158	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.137	NA
HAPS Speciation				
Product - select from list			Crude Oil	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	50	0.00221	
benzene	78.11	50	0.00192	
2,2,4 TMP	114.23	50	0.00016	
toluene	92.14	50	0.00081	
ethylbenzene	106.17	50	0.00009	
xylenes	106.17	50	0.00027	
naphthalene	128.17	50	1.35E-07	
cumene	120.19	50	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.007897	6.158	0.00128	
benzene	0.007564	6.158	0.00123	
2,2,4 TMP	0.000424	6.158	0.00007	
toluene	0.002714	6.158	0.00044	
ethylbenzene	0.000260	6.158	0.00004	
xylenes	0.000785	6.158	0.00013	
naphthalene	3.24E-07	6.158	0.00000	
cumene	0.00E+00	6.158	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.004	207	86.18	0.00961
benzene	0.006	207	78.11	0.01590
2,2,4 TMP	0.001	207	114.23	0.00181
toluene	0.01	207	92.14	0.02247
ethylbenzene	0.004	207	106.17	0.00780
xylenes	0.014	207	106.17	0.02730
naphthalene	0.0003684	207	128.17	0.00059
cumene	0	207	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.82
benzene	6.906	1211	220.79	0.48
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

NOTE - THIS SPREADSHEET IS USED TO ESTIMATE AVERAGE SPECIATION FOR LOADING CALCULATIONS

Nearest US Location		Albany, NY
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**

Absolute Pressure	P_A	14.55	psi
Average True Vapor Pressure		0.0054	psia
Average TAA		508.22	°R

MONTH January

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horizontal surface		I	532.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**483.25**	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient		T_{AN}	475.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	483.65	
Average Daily Liquid Surface Temperature Eq. 2-6				
TLA = 0.3*TAA + 0.7*TB + 0.004		T_{LA}	**484.06**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.002	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concentrations Eq. 40-6 $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00055	
benzene	78.11	130	0.00251	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02496	
ethylbenzene	106.17	130	0.00273	
xylenes	106.17	130	0.05244	
naphthalene	128.17	130	2.42E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000002	0.002	0.0008269	
benzene	0.000008	0.002	0.00418	
2,2,4 TMP	0.000000	0.002	-	
toluene	0.000065	0.002	0.03522	
ethylbenzene	0.000006	0.002	0.00334	
xylenes	0.000118	0.002	0.06421	
naphthalene	4.51E-07	0.002	0.00025	
cumene	0.00E+00	0.002	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.70
benzene	6.906	1211	220.79	0.40
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH February

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant		A	12.10	
Vapor Pressure Equation Constant		B	8907.00	°R
Daily total solar insolation on a horiz		I	789.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**485.80**	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	486.39	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**487.00**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.002	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00054	
benzene	78.11	130	0.00247	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02488	
ethylbenzene	106.17	130	0.00276	
xylenes	106.17	130	0.05306	
naphthalene	128.17	130	2.54E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000002	0.002	0.00081	
benzene	0.000008	0.002	0.00412	
2,2,4 TMP	0.000000	0.002	-	
toluene	0.000072	0.002	0.03510	
ethylbenzene	0.000007	0.002	0.00337	
xylenes	0.000133	0.002	0.06497	
naphthalene	5.29E-07	0.002	0.00026	
cumene	0.00E+00	0.002	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.76
benzene	6.906	1211	220.79	0.44
2,2,4 TMP	6.812	1257.8	220.74	0.22
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH March

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant		A	12.10	
Vapor Pressure Equation Constant		B	8907.00	°R
Daily total solar insolation on a horiz		I	1096.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**494.80**	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	495.62	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**496.47**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.003	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00050	
benzene	78.11	130	0.00236	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02458	
ethylbenzene	106.17	130	0.00284	
xylenes	106.17	130	0.05489	
naphthalene	128.17	130	2.94E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000002	0.003	0.00076	
benzene	0.000011	0.003	0.00392	
2,2,4 TMP	0.000000	0.003	-	
toluene	0.000101	0.003	0.03468	
ethylbenzene	0.000010	0.003	0.00348	
xylenes	0.000196	0.003	0.06720	
naphthalene	8.67E-07	0.003	0.00030	
cumene	0.00E+00	0.003	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.01
benzene	6.906	1211	220.79	0.59
2,2,4 TMP	6.812	1257.8	220.74	0.29
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH April

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	508.57	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**509.73**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.005	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00046	
benzene	78.11	130	0.00220	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02407	
ethylbenzene	106.17	130	0.00295	
xylenes	106.17	130	0.05708	
naphthalene	128.17	130	3.54E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000003	0.005	0.00069	
benzene	0.000017	0.005	0.00366	
2,2,4 TMP	0.000000	0.005	-	
toluene	0.000158	0.005	0.03396	
ethylbenzene	0.000017	0.005	0.00361	
xylenes	0.000324	0.005	0.06989	
naphthalene	1.67E-06	0.005	0.00036	
cumene	0.00E+00	0.005	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH May

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	519.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**520.55**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.007	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00042	
benzene	78.11	130	0.00208	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02360	
ethylbenzene	106.17	130	0.00301	
xylenes	106.17	130	0.05856	
naphthalene	128.17	130	4.06E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000004	0.007	0.00064	
benzene	0.000023	0.007	0.00346	
2,2,4 TMP	0.000000	0.007	-	
toluene	0.000222	0.007	0.03329	
ethylbenzene	0.000025	0.007	0.00369	
xylenes	0.000479	0.007	0.07171	
naphthalene	2.75E-06	0.007	0.00041	
cumene	0.00E+00	0.007	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.96
benzene	6.906	1211	220.79	1.20
2,2,4 TMP	6.812	1257.8	220.74	0.61
toluene	7.017	1377.6	222.64	0.34
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.09
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.05

MONTH June

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.84	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**530.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.009	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00040	
benzene	78.11	130	0.00198	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02314	
ethylbenzene	106.17	130	0.00306	
xylenes	106.17	130	0.05968	
naphthalene	128.17	130	4.56E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000005	0.009	0.00060	
benzene	0.000030	0.009	0.00329	
2,2,4 TMP	0.000000	0.009	-	
toluene	0.000298	0.009	0.03264	
ethylbenzene	0.000034	0.009	0.00375	
xylenes	0.000667	0.009	0.07308	
naphthalene	4.22E-06	0.009	0.00046	
cumene	0.00E+00	0.009	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.56
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.46
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.07

MONTH July

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	532.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**534.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.010	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_i M_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00039	
benzene	78.11	130	0.00194	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02294	
ethylbenzene	106.17	130	0.00308	
xylenes	106.17	130	0.06008	
naphthalene	128.17	130	4.76E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000006	0.010	0.00058	
benzene	0.000033	0.010	0.00322	
2,2,4 TMP	0.000000	0.010	-	
toluene	0.000335	0.010	0.03237	
ethylbenzene	0.000039	0.010	0.00377	
xylenes	0.000760	0.010	0.07356	
naphthalene	4.99E-06	0.010	0.00048	
cumene	0.00E+00	0.010	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.76
benzene	6.906	1211	220.79	1.73
2,2,4 TMP	6.812	1257.8	220.74	0.89
toluene	7.017	1377.6	222.64	0.51
ethylbenzene	6.95	1419.3	212.61	0.17
xylenes	7.009	1462.3	215.11	0.15
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH August

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**532.65**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.010	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_i M_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00039	
benzene	78.11	130	0.00195	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02302	
ethylbenzene	106.17	130	0.00307	
xylenes	106.17	130	0.05992	
naphthalene	128.17	130	4.68E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000006	0.010	0.00059	
benzene	0.000032	0.010	0.00325	
2,2,4 TMP	0.000000	0.010	-	
toluene	0.000320	0.010	0.03248	
ethylbenzene	0.000037	0.010	0.00376	
xylenes	0.000722	0.010	0.07337	
naphthalene	4.68E-06	0.010	0.00048	
cumene	0.00E+00	0.010	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.66
benzene	6.906	1211	220.79	1.66
2,2,4 TMP	6.812	1257.8	220.74	0.86
toluene	7.017	1377.6	222.64	0.49
ethylbenzene	6.95	1419.3	212.61	0.16
xylenes	7.009	1462.3	215.11	0.14
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH September

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	523.03	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**524.03**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.007	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_i M_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00041	
benzene	78.11	130	0.00204	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02343	
ethylbenzene	106.17	130	0.00303	
xylenes	106.17	130	0.05899	
naphthalene	128.17	130	4.24E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000005	0.007	0.00062	
benzene	0.000025	0.007	0.00340	
2,2,4 TMP	0.000000	0.007	-	
toluene	0.000247	0.007	0.03306	
ethylbenzene	0.000028	0.007	0.00371	
xylenes	0.000540	0.007	0.07223	
naphthalene	3.21E-06	0.007	0.00043	
cumene	0.00E+00	0.007	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.14
benzene	6.906	1211	220.79	1.32
2,2,4 TMP	6.812	1257.8	220.74	0.68
toluene	7.017	1377.6	222.64	0.38
ethylbenzene	6.95	1419.3	212.61	0.12
xylenes	7.009	1462.3	215.11	0.11
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.06

MONTH October

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	510.41	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**511.10**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.005	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00045	
benzene	78.11	130	0.00219	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02401	
ethylbenzene	106.17	130	0.00296	
xylenes	106.17	130	0.05728	
naphthalene	128.17	130	3.60E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000003	0.005	0.00068	
benzene	0.000018	0.005	0.00364	
2,2,4 TMP	0.000000	0.005	-	
toluene	0.000165	0.005	0.03388	
ethylbenzene	0.000018	0.005	0.00362	
xylenes	0.000341	0.005	0.07014	
naphthalene	1.78E-06	0.005	0.00037	
cumene	0.00E+00	0.005	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.52
benzene	6.906	1211	220.79	0.92
2,2,4 TMP	6.812	1257.8	220.74	0.46
toluene	7.017	1377.6	222.64	0.25
ethylbenzene	6.95	1419.3	212.61	0.08
xylenes	7.009	1462.3	215.11	0.07
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH November

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	500.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**500.61**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.003	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00049	
benzene	78.11	130	0.00231	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02443	
ethylbenzene	106.17	130	0.00288	
xylenes	106.17	130	0.05562	
naphthalene	128.17	130	3.12E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000002	0.003	0.00074	
benzene	0.000013	0.003	0.00384	
2,2,4 TMP	0.000000	0.003	-	
toluene	0.000116	0.003	0.03447	
ethylbenzene	0.000012	0.003	0.00352	
xylenes	0.000230	0.003	0.06810	
naphthalene	1.07E-06	0.003	0.00032	
cumene	0.00E+00	0.003	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.14
benzene	6.906	1211	220.79	0.67
2,2,4 TMP	6.812	1257.8	220.74	0.34
toluene	7.017	1377.6	222.64	0.18
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH December

		Symbol		Units
Product Type			Distillate Fuel Oil No.2	
Vapor Molecular weight		M_v	**130.00**	
Vapor Pressure Equation Constant A		A	12.10	
Vapor Pressure Equation Constant B		B	8907.00	°R
Daily total solar insolation on a horiz		I	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	489.17	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**489.49**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.002	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.000	NA
HAPS Speciation				
Product - select from list			Diesel	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	130	0.00053	
benzene	78.11	130	0.00244	
2,2,4 TMP	114.23	130	0.00000	
toluene	92.14	130	0.02481	
ethylbenzene	106.17	130	0.00278	
xylenes	106.17	130	0.05356	
naphthalene	128.17	130	2.64E-04	
cumene	120.19	130	0.00E+00	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000002	0.002	0.00080	
benzene	0.000009	0.002	0.00406	
2,2,4 TMP	0.000000	0.002	-	
toluene	0.000079	0.002	0.03500	
ethylbenzene	0.000008	0.002	0.00340	
xylenes	0.000148	0.002	0.06558	
naphthalene	6.04E-07	0.002	0.00027	
cumene	0.00E+00	0.002	-	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.000001	188	86.18	0.00000
benzene	0.000008	188	78.11	0.00002
2,2,4 TMP	0	188	114.23	0.00000
toluene	0.00032	188	92.14	0.00065
ethylbenzene	0.00013	188	106.17	0.00023
xylenes	0.0029	188	106.17	0.00514
naphthalene	0.0007565	188	128.17	0.00111
cumene	0	188	120.19	0.00000
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.82
benzene	6.906	1211	220.79	0.48
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

NOTE - THIS SPREADSHEET IS USED TO ESTIMATE AVERAGE SPECIATION FOR LOADING CALCULATIONS

Nearest US Location		Albany, NY
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

Absolute Pressure P_A 14.55 psi

MONTH January

		Symbol		Units
Product Type			Gasoline - RVP 15	
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	532.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**483.25**	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient		T_{AN}	475.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	483.65	
Average Daily Liquid Surface Temperature Eq. 2-6				
TLA = 0.3*TAA + 0.7*TB + 0.004		T_{LA}	**484.06**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.050	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.081	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.03732	
benzene	78.11	60	0.00314	
2,2,4 TMP	114.23	60	0.00307	
toluene	92.14	60	0.00293	
ethylbenzene	106.17	60	0.00021	
xylenes	106.17	60	0.00063	
naphthalene	128.17	60	6.65E-07	
cumene	120.19	60	2.18E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.105500	4.050	0.0260462	
benzene	0.009797	4.050	0.00242	
2,2,4 TMP	0.006540	4.050	0.00161	
toluene	0.007744	4.050	0.00191	
ethylbenzene	0.000482	4.050	0.00012	
xylenes	0.001454	4.050	0.00036	
naphthalene	1.26E-06	4.050	0.00000	
cumene	4.41E-05	4.050	0.00001	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.70
benzene	6.906	1211	220.79	0.40
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH February

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	789.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**485.80**	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	486.39	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**487.00**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.308	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.088	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.03840	
benzene	78.11	60	0.00325	
2,2,4 TMP	114.23	60	0.00319	
toluene	92.14	60	0.00307	
ethylbenzene	106.17	60	0.00022	
xylenes	106.17	60	0.00067	
naphthalene	128.17	60	7.33E-07	
cumene	120.19	60	2.33E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.115470	4.308	0.02680	
benzene	0.010789	4.308	0.00250	
2,2,4 TMP	0.007230	4.308	0.00168	
toluene	0.008626	4.308	0.00200	
ethylbenzene	0.000544	4.308	0.00013	
xylenes	0.001644	4.308	0.00038	
naphthalene	1.48E-06	4.308	0.00000	
cumene	5.03E-05	4.308	0.00001	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.76
benzene	6.906	1211	220.79	0.44
2,2,4 TMP	6.812	1257.8	220.74	0.22
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH March

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1096.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**494.80**	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	495.62	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**496.47**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.227	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.111	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.04195	
benzene	78.11	60	0.00362	
2,2,4 TMP	114.23	60	0.00359	
toluene	92.14	60	0.00354	
ethylbenzene	106.17	60	0.00027	
xylenes	106.17	60	0.00081	
naphthalene	128.17	60	9.90E-07	
cumene	120.19	60	2.90E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.153056	5.227	0.02928	
benzene	0.014575	5.227	0.00279	
2,2,4 TMP	0.009883	5.227	0.00189	
toluene	0.012077	5.227	0.00231	
ethylbenzene	0.000796	5.227	0.00015	
xylenes	0.002410	5.227	0.00046	
naphthalene	2.43E-06	5.227	0.00000	
cumene	7.59E-05	5.227	0.00001	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.01
benzene	6.906	1211	220.79	0.59
2,2,4 TMP	6.812	1257.8	220.74	0.29
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH April

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1496.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	508.57	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**509.73**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.770	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.155	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.04705	
benzene	78.11	60	0.00416	
2,2,4 TMP	114.23	60	0.00419	
toluene	92.14	60	0.00427	
ethylbenzene	106.17	60	0.00034	
xylenes	106.17	60	0.00104	
naphthalene	128.17	60	1.47E-06	
cumene	120.19	60	3.85E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.222338	6.770	0.03284	
benzene	0.021705	6.770	0.00321	
2,2,4 TMP	0.014948	6.770	0.00221	
toluene	0.018860	6.770	0.00279	
ethylbenzene	0.001315	6.770	0.00019	
xylenes	0.003998	6.770	0.00059	
naphthalene	4.67E-06	6.770	0.00000	
cumene	1.30E-04	6.770	0.00002	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH May

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1739.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	519.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**520.55**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	8.281	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.207	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.05130	
benzene	78.11	60	0.00463	
2,2,4 TMP	114.23	60	0.00471	
toluene	92.14	60	0.00492	
ethylbenzene	106.17	60	0.00041	
xylenes	106.17	60	0.00126	
naphthalene	128.17	60	1.98E-06	
cumene	120.19	60	4.77E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.296469	8.281	0.03580	
benzene	0.029494	8.281	0.00356	
2,2,4 TMP	0.020557	8.281	0.00248	
toluene	0.026587	8.281	0.00321	
ethylbenzene	0.001934	8.281	0.00023	
xylenes	0.005898	8.281	0.00071	
naphthalene	7.71E-06	8.281	0.00000	
cumene	1.98E-04	8.281	0.00002	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.96
benzene	6.906	1211	220.79	1.20
2,2,4 TMP	6.812	1257.8	220.74	0.61
toluene	7.017	1377.6	222.64	0.34
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.09
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.05

MONTH June

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1853.0	Btu/ft²-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.84	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**530.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	9.854	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.275	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.05516	
benzene	78.11	60	0.00505	
2,2,4 TMP	114.23	60	0.00520	
toluene	92.14	60	0.00555	
ethylbenzene	106.17	60	0.00048	
xylenes	106.17	60	0.00147	
naphthalene	128.17	60	2.56E-06	
cumene	120.19	60	5.71E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.379372	9.854	0.03850	
benzene	0.038350	9.854	0.00389	
2,2,4 TMP	0.027005	9.854	0.00274	
toluene	0.035678	9.854	0.00362	
ethylbenzene	0.002690	9.854	0.00027	
xylenes	0.008226	9.854	0.00083	
naphthalene	1.18E-05	9.854	0.00000	
cumene	2.82E-04	9.854	0.00003	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.56
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.46
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.07

MONTH July

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	532.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**534.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	10.552	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.312	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.05673	
benzene	78.11	60	0.00523	
2,2,4 TMP	114.23	60	0.00541	
toluene	92.14	60	0.00581	
ethylbenzene	106.17	60	0.00051	
xylenes	106.17	60	0.00157	
naphthalene	128.17	60	2.82E-06	
cumene	120.19	60	6.13E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.417841	10.552	0.03960	
benzene	0.042502	10.552	0.00403	
2,2,4 TMP	0.030049	10.552	0.00285	
toluene	0.040033	10.552	0.00379	
ethylbenzene	0.003061	10.552	0.00029	
xylenes	0.009369	10.552	0.00089	
naphthalene	1.40E-05	10.552	0.00000	
cumene	3.24E-04	10.552	0.00003	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.76
benzene	6.906	1211	220.79	1.73
2,2,4 TMP	6.812	1257.8	220.74	0.89
toluene	7.017	1377.6	222.64	0.51
ethylbenzene	6.95	1419.3	212.61	0.17
xylenes	7.009	1462.3	215.11	0.15
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH August

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**532.65**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	10.272	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.297	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.05611	
benzene	78.11	60	0.00516	
2,2,4 TMP	114.23	60	0.00533	
toluene	92.14	60	0.00571	
ethylbenzene	106.17	60	0.00050	
xylenes	106.17	60	0.00153	
naphthalene	128.17	60	2.72E-06	
cumene	120.19	60	5.96E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.402264	10.272	0.03916	
benzene	0.040817	10.272	0.00397	
2,2,4 TMP	0.028813	10.272	0.00281	
toluene	0.038260	10.272	0.00372	
ethylbenzene	0.002909	10.272	0.00028	
xylenes	0.008902	10.272	0.00087	
naphthalene	1.31E-05	10.272	0.00000	
cumene	3.06E-04	10.272	0.00003	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.66
benzene	6.906	1211	220.79	1.66
2,2,4 TMP	6.812	1257.8	220.74	0.86
toluene	7.017	1377.6	222.64	0.49
ethylbenzene	6.95	1419.3	212.61	0.16
xylenes	7.009	1462.3	215.11	0.14
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH September

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	523.03	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**524.03**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	8.819	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.229	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.05267	
benzene	78.11	60	0.00478	
2,2,4 TMP	114.23	60	0.00489	
toluene	92.14	60	0.00514	
ethylbenzene	106.17	60	0.00044	
xylenes	106.17	60	0.00133	
naphthalene	128.17	60	2.18E-06	
cumene	120.19	60	5.09E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.324234	8.819	0.03676	
benzene	0.032444	8.819	0.00368	
2,2,4 TMP	0.022698	8.819	0.00257	
toluene	0.029583	8.819	0.00335	
ethylbenzene	0.002181	8.819	0.00025	
xylenes	0.006656	8.819	0.00075	
naphthalene	9.01E-06	8.819	0.00000	
cumene	2.25E-04	8.819	0.00003	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.14
benzene	6.906	1211	220.79	1.32
2,2,4 TMP	6.812	1257.8	220.74	0.68
toluene	7.017	1377.6	222.64	0.38
ethylbenzene	6.95	1419.3	212.61	0.12
xylenes	7.009	1462.3	215.11	0.11
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.06

MONTH October

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	510.41	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**511.10**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	6.948	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.161	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.04758	
benzene	78.11	60	0.00422	
2,2,4 TMP	114.23	60	0.00426	
toluene	92.14	60	0.00435	
ethylbenzene	106.17	60	0.00035	
xylenes	106.17	60	0.00107	
naphthalene	128.17	60	1.53E-06	
cumene	120.19	60	3.96E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.230735	6.948	0.03321	
benzene	0.022580	6.948	0.00325	
2,2,4 TMP	0.015575	6.948	0.00224	
toluene	0.019713	6.948	0.00284	
ethylbenzene	0.001382	6.948	0.00020	
xylenes	0.004203	6.948	0.00060	
naphthalene	4.98E-06	6.948	0.00000	
cumene	1.38E-04	6.948	0.00002	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.52
benzene	6.906	1211	220.79	0.92
2,2,4 TMP	6.812	1257.8	220.74	0.46
toluene	7.017	1377.6	222.64	0.25
ethylbenzene	6.95	1419.3	212.61	0.08
xylenes	7.009	1462.3	215.11	0.07
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH November

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	500.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**500.61**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.675	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.123	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.04353	
benzene	78.11	60	0.00379	
2,2,4 TMP	114.23	60	0.00377	
toluene	92.14	60	0.00376	
ethylbenzene	106.17	60	0.00029	
xylenes	106.17	60	0.00088	
naphthalene	128.17	60	1.12E-06	
cumene	120.19	60	3.18E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.172439	5.675	0.03038	
benzene	0.016552	5.675	0.00292	
2,2,4 TMP	0.011279	5.675	0.00199	
toluene	0.013925	5.675	0.00245	
ethylbenzene	0.000934	5.675	0.00016	
xylenes	0.002834	5.675	0.00050	
naphthalene	2.99E-06	5.675	0.00000	
cumene	9.02E-05	5.675	0.00002	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.14
benzene	6.906	1211	220.79	0.67
2,2,4 TMP	6.812	1257.8	220.74	0.34
toluene	7.017	1377.6	222.64	0.18
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH December

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	489.17	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**489.49**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.536	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.093	NA
HAPS Speciation				
Product - select from list			blendstock	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.03933	
benzene	78.11	60	0.00335	
2,2,4 TMP	114.23	60	0.00329	
toluene	92.14	60	0.00319	
ethylbenzene	106.17	60	0.00023	
xylenes	106.17	60	0.00071	
naphthalene	128.17	60	7.95E-07	
cumene	120.19	60	2.47E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.124513	4.536	0.02745	
benzene	0.011693	4.536	0.00258	
2,2,4 TMP	0.007860	4.536	0.00173	
toluene	0.009439	4.536	0.00208	
ethylbenzene	0.000602	4.536	0.00013	
xylenes	0.001821	4.536	0.00040	
naphthalene	1.69E-06	4.536	0.00000	
cumene	5.62E-05	4.536	0.00001	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.136	96	86.18	0.15150
benzene	0.02	96	78.11	0.02458
2,2,4 TMP	0.04	96	114.23	0.03362
toluene	0.075	96	92.14	0.07814
ethylbenzene	0.02	96	106.17	0.01808
xylenes	0.07	96	106.17	0.06329
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.82
benzene	6.906	1211	220.79	0.48
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

NOTE - THIS SPREADSHEET IS USED TO ESTIMATE AVERAGE SPECIATION FOR LOADING CALCULATIONS

Nearest US Location		Albany, NY
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

Absolute Pressure P_A 14.55 psi

MONTH January

		Symbol		Units
Product Type			Gasoline - RVP 15	
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	532.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	483.25	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient		T_{AN}	475.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	483.65	
Average Daily Liquid Surface Temperature Eq. 2-6				
TLA = 0.3*TAA + 0.7*TB + 0.004		T_{LA}	484.06	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.050	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.081	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00274	
benzene	78.11	60	0.00283	
2,2,4 TMP	114.23	60	0.00307	
toluene	92.14	60	0.00273	
ethylbenzene	106.17	60	0.00015	
xylenes	106.17	60	0.00063	
naphthalene	128.17	60	6.65E-07	
cumene	120.19	60	2.18E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.007757	4.050	0.0019152	
benzene	0.008817	4.050	0.00218	
2,2,4 TMP	0.006540	4.050	0.00161	
toluene	0.007228	4.050	0.00178	
ethylbenzene	0.000337	4.050	0.00008	
xylenes	0.001454	4.050	0.00036	
naphthalene	1.26E-06	4.050	0.00000	
cumene	4.41E-05	4.050	0.00001	
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
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.70
benzene	6.906	1211	220.79	0.40
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH February

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	789.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	485.80	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	486.39	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	487.00	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.308	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.088	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00282	
benzene	78.11	60	0.00293	
2,2,4 TMP	114.23	60	0.00319	
toluene	92.14	60	0.00286	
ethylbenzene	106.17	60	0.00016	
xylenes	106.17	60	0.00067	
naphthalene	128.17	60	7.33E-07	
cumene	120.19	60	2.33E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.008490	4.308	0.00197	
benzene	0.009710	4.308	0.00225	
2,2,4 TMP	0.007230	4.308	0.00168	
toluene	0.008051	4.308	0.00187	
ethylbenzene	0.000381	4.308	0.00009	
xylenes	0.001644	4.308	0.00038	
naphthalene	1.48E-06	4.308	0.00000	
cumene	5.03E-05	4.308	0.00001	
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
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.76
benzene	6.906	1211	220.79	0.44
2,2,4 TMP	6.812	1257.8	220.74	0.22
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

MONTH March

		Symbol		Units
Product Type			Gasoline - RVP 13.5	
Vapor Molecular weight		M_v	62.00	
Vapor Pressure Equation Constant A		A	11.63	
Vapor Pressure Equation Constant B		B	5015.72	°R
Daily total solar insolation on a horiz		I	1096.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	494.80	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	495.62	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	496.47	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.615	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.095	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00325	
benzene	78.11	62	0.00343	
2,2,4 TMP	114.23	62	0.00378	
toluene	92.14	62	0.00348	
ethylbenzene	106.17	62	0.00020	
xylenes	106.17	62	0.00086	
naphthalene	128.17	62	1.04E-06	
cumene	120.19	62	3.05E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.010785	4.615	0.00234	
benzene	0.012571	4.615	0.00272	
2,2,4 TMP	0.009471	4.615	0.00205	
toluene	0.010802	4.615	0.00234	
ethylbenzene	0.000534	4.615	0.00012	
xylenes	0.002310	4.615	0.00050	
naphthalene	2.33E-06	4.615	0.00000	
cumene	7.27E-05	4.615	0.00002	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.01
benzene	6.906	1211	220.79	0.59
2,2,4 TMP	6.812	1257.8	220.74	0.29
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH April

		Symbol		Units
Product Type			Gasoline - RVP 13	
Vapor Molecular weight		M_v	**62.00**	
Vapor Pressure Equation Constant A		A	11.64	
Vapor Pressure Equation Constant E		B	5043.58	°R
Daily total solar insolation on a horiz		I	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	508.57	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**509.73**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.749	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.125	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00379	
benzene	78.11	62	0.00410	
2,2,4 TMP	114.23	62	0.00459	
toluene	92.14	62	0.00436	
ethylbenzene	106.17	62	0.00026	
xylenes	106.17	62	0.00114	
naphthalene	128.17	62	1.61E-06	
cumene	120.19	62	4.21E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.015667	5.749	0.00273	
benzene	0.018721	5.749	0.00326	
2,2,4 TMP	0.014325	5.749	0.00249	
toluene	0.016869	5.749	0.00293	
ethylbenzene	0.000882	5.749	0.00015	
xylenes	0.003831	5.749	0.00067	
naphthalene	4.47E-06	5.749	0.00000	
cumene	1.25E-04	5.749	0.00002	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH May

		Symbol		Units
Product Type			Gasoline - RVP 9	
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant E		B	5315.06	°R
Daily total solar insolation on a horiz		I	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	519.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**520.55**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	4.692	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.097	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00564	
benzene	78.11	68	0.00623	
2,2,4 TMP	114.23	68	0.00705	
toluene	92.14	68	0.00687	
ethylbenzene	106.17	68	0.00043	
xylenes	106.17	68	0.00188	
naphthalene	128.17	68	2.97E-06	
cumene	120.19	68	7.13E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.020891	4.692	0.00445	
benzene	0.025438	4.692	0.00542	
2,2,4 TMP	0.019700	4.692	0.00420	
toluene	0.023780	4.692	0.00507	
ethylbenzene	0.001298	4.692	0.00028	
xylenes	0.005652	4.692	0.00120	
naphthalene	7.39E-06	4.692	0.00000	
cumene	1.89E-04	4.692	0.00004	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.96
benzene	6.906	1211	220.79	1.20
2,2,4 TMP	6.812	1257.8	220.74	0.61
toluene	7.017	1377.6	222.64	0.34
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.09
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.05

MONTH June

		Symbol		Units
Product Type			Gasoline - RVP 9	
Vapor Molecular weight		M_v	**68.00**	
Vapor Pressure Equation Constant A		A	11.76	
Vapor Pressure Equation Constant E		B	5315.06	°R
Daily total solar insolation on a horiz		I	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.84	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**530.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	5.658	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.122	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00599	
benzene	78.11	68	0.00672	
2,2,4 TMP	114.23	68	0.00768	
toluene	92.14	68	0.00764	
ethylbenzene	106.17	68	0.00050	
xylenes	106.17	68	0.00218	
naphthalene	128.17	68	3.78E-06	
cumene	120.19	68	8.43E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.026733	5.658	0.00472	
benzene	0.033077	5.658	0.00585	
2,2,4 TMP	0.025880	5.658	0.00457	
toluene	0.031912	5.658	0.00564	
ethylbenzene	0.001805	5.658	0.00032	
xylenes	0.007883	5.658	0.00139	
naphthalene	1.13E-05	5.658	0.00000	
cumene	2.70E-04	5.658	0.00005	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.56
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.46
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.07

MONTH July

		Symbol		Units
Product Type			Gasoline - RVP 9	
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 horiz		I	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	532.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**534.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.091	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.135	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00613	
benzene	78.11	68	0.00691	
2,2,4 TMP	114.23	68	0.00794	
toluene	92.14	68	0.00797	
ethylbenzene	106.17	68	0.00053	
xylenes	106.17	68	0.00230	
naphthalene	128.17	68	4.15E-06	
cumene	120.19	68	9.00E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.029443	6.091	0.00483	
benzene	0.036658	6.091	0.00602	
2,2,4 TMP	0.028797	6.091	0.00473	
toluene	0.035808	6.091	0.00588	
ethylbenzene	0.002053	6.091	0.00034	
xylenes	0.008979	6.091	0.00147	
naphthalene	1.34E-05	6.091	0.00000	
cumene	3.10E-04	6.091	0.00005	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.76
benzene	6.906	1211	220.79	1.73
2,2,4 TMP	6.812	1257.8	220.74	0.89
toluene	7.017	1377.6	222.64	0.51
ethylbenzene	6.95	1419.3	212.61	0.17
xylenes	7.009	1462.3	215.11	0.15
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH August

		Symbol		Units
Product Type			Gasoline - RVP 9	
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 horiz		I	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**532.65**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.916	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.130	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	68	0.00607	
benzene	78.11	68	0.00684	
2,2,4 TMP	114.23	68	0.00784	
toluene	92.14	68	0.00784	
ethylbenzene	106.17	68	0.00052	
xylenes	106.17	68	0.00225	
naphthalene	128.17	68	4.00E-06	
cumene	120.19	68	8.77E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.028346	5.916	0.00479	
benzene	0.035205	5.916	0.00595	
2,2,4 TMP	0.027613	5.916	0.00467	
toluene	0.034222	5.916	0.00578	
ethylbenzene	0.001952	5.916	0.00033	
xylenes	0.008531	5.916	0.00144	
naphthalene	1.26E-05	5.916	0.00000	
cumene	2.94E-04	5.916	0.00005	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.66
benzene	6.906	1211	220.79	1.66
2,2,4 TMP	6.812	1257.8	220.74	0.86
toluene	7.017	1377.6	222.64	0.49
ethylbenzene	6.95	1419.3	212.61	0.16
xylenes	7.009	1462.3	215.11	0.14
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08

MONTH September

		Symbol		Units
Product Type			Gasoline - RVP 13	
Vapor Molecular weight		M_v	**62.00**	
Vapor Pressure Equation Constant A		A	11.64	
Vapor Pressure Equation Constant B		B	5043.58	°R
Daily total solar insolation on a horiz		I	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	523.03	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TE		T_{LA}	**524.03**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	7.532	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.180	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00422	
benzene	78.11	62	0.00468	
2,2,4 TMP	114.23	62	0.00532	
toluene	92.14	62	0.00522	
ethylbenzene	106.17	62	0.00033	
xylenes	106.17	62	0.00145	
naphthalene	128.17	62	2.37E-06	
cumene	120.19	62	5.54E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.022847	7.532	0.00303	
benzene	0.027983	7.532	0.00372	
2,2,4 TMP	0.021752	7.532	0.00289	
toluene	0.026460	7.532	0.00351	
ethylbenzene	0.001463	7.532	0.00019	
xylenes	0.006378	7.532	0.00085	
naphthalene	8.63E-06	7.532	0.00000	
cumene	2.15E-04	7.532	0.00003	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.14
benzene	6.906	1211	220.79	1.32
2,2,4 TMP	6.812	1257.8	220.74	0.68
toluene	7.017	1377.6	222.64	0.38
ethylbenzene	6.95	1419.3	212.61	0.12
xylenes	7.009	1462.3	215.11	0.11
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.06

MONTH October

		Symbol		Units
Product Type			Gasoline - RVP 13.5	
Vapor Molecular weight		M_v	**62.00**	
Vapor Pressure Equation Constant A		A	11.63	
Vapor Pressure Equation Constant B		B	5015.72	°R
Daily total solar insolation on a horiz		I	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	510.41	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**511.10**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	6.162	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.137	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	62	0.00367	
benzene	78.11	62	0.00398	
2,2,4 TMP	114.23	62	0.00446	
toluene	92.14	62	0.00425	
ethylbenzene	106.17	62	0.00026	
xylenes	106.17	62	0.00112	
naphthalene	128.17	62	1.60E-06	
cumene	120.19	62	4.15E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.016259	6.162	0.00264	
benzene	0.019475	6.162	0.00316	
2,2,4 TMP	0.014926	6.162	0.00242	
toluene	0.017633	6.162	0.00286	
ethylbenzene	0.000927	6.162	0.00015	
xylenes	0.004028	6.162	0.00065	
naphthalene	4.77E-06	6.162	0.00000	
cumene	1.32E-04	6.162	0.00002	
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
naphthalene	0.00415	92	128.17	0.00298
cumene	0.005	92	120.19	0.00383
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.52
benzene	6.906	1211	220.79	0.92
2,2,4 TMP	6.812	1257.8	220.74	0.46
toluene	7.017	1377.6	222.64	0.25
ethylbenzene	6.95	1419.3	212.61	0.08
xylenes	7.009	1462.3	215.11	0.07
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03

MONTH November

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	500.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**500.61**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	5.675	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.123	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00320	
benzene	78.11	60	0.00341	
2,2,4 TMP	114.23	60	0.00377	
toluene	92.14	60	0.00351	
ethylbenzene	106.17	60	0.00020	
xylenes	106.17	60	0.00088	
naphthalene	128.17	60	1.12E-06	
cumene	120.19	60	3.18E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.012679	5.675	0.00223	
benzene	0.014897	5.675	0.00262	
2,2,4 TMP	0.011279	5.675	0.00199	
toluene	0.012997	5.675	0.00229	
ethylbenzene	0.000654	5.675	0.00012	
xylenes	0.002834	5.675	0.00050	
naphthalene	2.99E-06	5.675	0.00000	
cumene	9.02E-05	5.675	0.00002	
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
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.14
benzene	6.906	1211	220.79	0.67
2,2,4 TMP	6.812	1257.8	220.74	0.34
toluene	7.017	1377.6	222.64	0.18
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02

MONTH December

		Symbol		Units
Product Type			Gasoline - RVP 15	
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 horiz		I	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	489.17	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**489.49**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	4.536	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.093	NA
HAPS Speciation				
Product - select from list			Gasoline	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	60	0.00289	
benzene	78.11	60	0.00301	
2,2,4 TMP	114.23	60	0.00329	
toluene	92.14	60	0.00298	
ethylbenzene	106.17	60	0.00016	
xylenes	106.17	60	0.00071	
naphthalene	128.17	60	7.95E-07	
cumene	120.19	60	2.47E-05	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.009155	4.536	0.00202	
benzene	0.010524	4.536	0.00232	
2,2,4 TMP	0.007860	4.536	0.00173	
toluene	0.008810	4.536	0.00194	
ethylbenzene	0.000422	4.536	0.00009	
xylenes	0.001821	4.536	0.00040	
naphthalene	1.69E-06	4.536	0.00000	
cumene	5.62E-05	4.536	0.00001	
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
naphthalene	0.00415	96	128.17	0.00311
cumene	0.005	96	120.19	0.00399
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.82
benzene	6.906	1211	220.79	0.48
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01

NOTE - THIS SPREADSHEET IS USED TO ESTIMATE AVERAGE SPECIATION FOR LOADING CALCULATIONS

Nearest US Location		Albany, NY
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**

Absolute Pressure P_A 14.55 psi

MONTH January

		Symbol		Units
Product Type			Denatured Ethanol (3% (	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horizontal surface		I	532.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**483.25**	°R
Average daily maximum ambient		T_{AX}	490.70	°R
Average daily minimum ambient t		T_{AN}	475.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	483.65	
Average Daily Liquid Surface Temperature Eq. 2-6				
TLA = 0.3*TAA + 0.7*TB + 0.004*		T_{LA}	**484.06**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.313	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A))^{0.5})^2$		P*	0.005	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concentrations Eq. 40-6	$Z_{Vi} = y_iM_i / M_V$			
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00067	
benzene	78.11	49	0.00069	
2,2,4 TMP	114.23	49	0.00075	
toluene	92.14	49	0.00067	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00015	
naphthalene	128.17	49	1.62E-07	
cumene	120.19	49	5.30E-06	
ethyl alcohol {ethanol}	46.07	49	5.28E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000118	0.313	0.0003788	
benzene	0.000135	0.313	0.00043	
2,2,4 TMP	0.000100	0.313	0.00032	
toluene	0.000110	0.313	0.00035	
ethylbenzene	0.000005	0.313	0.00002	
xylenes	0.000022	0.313	0.00007	
naphthalene	1.93E-08	0.313	0.00000	
cumene	6.73E-07	0.313	0.00000	
ethyl alcohol {ethanol}	1.75E-01	0.313	0.55950	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.70
benzene	6.906	1211	220.79	0.40
2,2,4 TMP	6.812	1257.8	220.74	0.19
toluene	7.017	1377.6	222.64	0.10
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.02
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.17

MONTH February

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		I	789.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**485.80**	°R
Average daily maximum		T_{AX}	493.80	°R
Average daily minimum		T_{AN}	477.80	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	486.39	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**487.00**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.347	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.006	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00066	
benzene	78.11	49	0.00068	
2,2,4 TMP	114.23	49	0.00074	
toluene	92.14	49	0.00067	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00016	
naphthalene	128.17	49	1.71E-07	
cumene	120.19	49	5.45E-06	
ethyl alcohol {ethanol}	46.07	49	5.36E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000130	0.347	0.00037	
benzene	0.000148	0.347	0.00043	
2,2,4 TMP	0.000110	0.347	0.00032	
toluene	0.000123	0.347	0.00035	
ethylbenzene	0.000006	0.347	0.00002	
xylenes	0.000025	0.347	0.00007	
naphthalene	2.26E-08	0.347	0.00000	
cumene	7.68E-07	0.347	0.00000	
ethyl alcohol {ethanol}	1.97E-01	0.347	0.56867	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.76
benzene	6.906	1211	220.79	0.44
2,2,4 TMP	6.812	1257.8	220.74	0.22
toluene	7.017	1377.6	222.64	0.11
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.19

MONTH March

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		I	1096.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**494.80**	°R
Average daily maximum		T_{AX}	503.50	°R
Average daily minimum		T_{AN}	486.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	495.62	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**496.47**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.479	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.008	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00063	
benzene	78.11	49	0.00067	
2,2,4 TMP	114.23	49	0.00074	
toluene	92.14	49	0.00068	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00017	
naphthalene	128.17	49	2.03E-07	
cumene	120.19	49	5.95E-06	
ethyl alcohol {ethanol}	46.07	49	5.63E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000172	0.479	0.00036	
benzene	0.000200	0.479	0.00042	
2,2,4 TMP	0.000151	0.479	0.00032	
toluene	0.000172	0.479	0.00036	
ethylbenzene	0.000009	0.479	0.00002	
xylenes	0.000037	0.479	0.00008	
naphthalene	3.71E-08	0.479	0.00000	
cumene	1.16E-06	0.479	0.00000	
ethyl alcohol {ethanol}	2.86E-01	0.479	0.59743	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.01
benzene	6.906	1211	220.79	0.59
2,2,4 TMP	6.812	1257.8	220.74	0.29
toluene	7.017	1377.6	222.64	0.15
ethylbenzene	6.95	1419.3	212.61	0.04
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.28

MONTH April

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		I	1496.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**507.45**	°R
Average daily maximum		T_{AX}	517.50	°R
Average daily minimum		T_{AN}	497.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	508.57	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**509.73**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	0.738	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.013	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00060	
benzene	78.11	49	0.00065	
2,2,4 TMP	114.23	49	0.00072	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00018	
naphthalene	128.17	49	2.53E-07	
cumene	120.19	49	6.63E-06	
ethyl alcohol {ethanol}	46.07	49	5.99E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000250	0.738	0.00034	
benzene	0.000298	0.738	0.00040	
2,2,4 TMP	0.000228	0.738	0.00031	
toluene	0.000269	0.738	0.00036	
ethylbenzene	0.000014	0.738	0.00002	
xylenes	0.000061	0.738	0.00008	
naphthalene	7.13E-08	0.738	0.00000	
cumene	1.99E-06	0.738	0.00000	
ethyl alcohol {ethanol}	4.69E-01	0.738	0.63576	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.47
benzene	6.906	1211	220.79	0.88
2,2,4 TMP	6.812	1257.8	220.74	0.44
toluene	7.017	1377.6	222.64	0.24
ethylbenzene	6.95	1419.3	212.61	0.07
xylenes	7.009	1462.3	215.11	0.06
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.46

MONTH May

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		I	1739.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**517.90**	°R
Average daily maximum		T_{AX}	528.40	°R
Average daily minimum		T_{AN}	507.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	519.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**520.55**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	1.034	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.018	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00057	
benzene	78.11	49	0.00063	
2,2,4 TMP	114.23	49	0.00071	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00019	
naphthalene	128.17	49	2.99E-07	
cumene	120.19	49	7.18E-06	
ethyl alcohol {ethanol}	46.07	49	6.27E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000333	1.034	0.00032	
benzene	0.000405	1.034	0.00039	
2,2,4 TMP	0.000314	1.034	0.00030	
toluene	0.000379	1.034	0.00037	
ethylbenzene	0.000021	1.034	0.00002	
xylenes	0.000090	1.034	0.00009	
naphthalene	1.18E-07	1.034	0.00000	
cumene	3.02E-06	1.034	0.00000	
ethyl alcohol {ethanol}	6.88E-01	1.034	0.66527	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.96
benzene	6.906	1211	220.79	1.20
2,2,4 TMP	6.812	1257.8	220.74	0.61
toluene	7.017	1377.6	222.64	0.34
ethylbenzene	6.95	1419.3	212.61	0.11
xylenes	7.009	1462.3	215.11	0.09
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.05
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.67

MONTH June

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		I	1853.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**527.45**	°R
Average daily maximum		T_{AX}	537.30	°R
Average daily minimum		T_{AN}	517.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	528.84	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**530.28**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	1.383	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		P*	0.025	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00054	
benzene	78.11	49	0.00061	
2,2,4 TMP	114.23	49	0.00070	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00005	
xylenes	106.17	49	0.00020	
naphthalene	128.17	49	3.43E-07	
cumene	120.19	49	7.65E-06	
ethyl alcohol {ethanol}	46.07	49	6.51E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000426	1.383	0.00031	
benzene	0.000527	1.383	0.00038	
2,2,4 TMP	0.000412	1.383	0.00030	
toluene	0.000508	1.383	0.00037	
ethylbenzene	0.000029	1.383	0.00002	
xylenes	0.000126	1.383	0.00009	
naphthalene	1.81E-07	1.383	0.00000	
cumene	4.30E-06	1.383	0.00000	
ethyl alcohol {ethanol}	9.55E-01	1.383	0.69041	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.50
benzene	6.906	1211	220.79	1.56
2,2,4 TMP	6.812	1257.8	220.74	0.80
toluene	7.017	1377.6	222.64	0.46
ethylbenzene	6.95	1419.3	212.61	0.15
xylenes	7.009	1462.3	215.11	0.13
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.07
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.93

MONTH July

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horizo		**I**	1872.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**531.35**	°R
Average daily maximum		T_{AX}	541.00	°R
Average daily minimum		T_{AN}	521.70	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	532.75	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**534.20**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	1.551	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.028	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00053	
benzene	78.11	49	0.00060	
2,2,4 TMP	114.23	49	0.00069	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00005	
xylenes	106.17	49	0.00020	
naphthalene	128.17	49	3.61E-07	
cumene	120.19	49	7.84E-06	
ethyl alcohol {ethanol}	46.07	49	6.60E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000469	1.551	0.00030	
benzene	0.000584	1.551	0.00038	
2,2,4 TMP	0.000459	1.551	0.00030	
toluene	0.000571	1.551	0.00037	
ethylbenzene	0.000033	1.551	0.00002	
xylenes	0.000143	1.551	0.00009	
naphthalene	2.14E-07	1.551	0.00000	
cumene	4.94E-06	1.551	0.00000	
ethyl alcohol {ethanol}	1.09E+00	1.551	0.70020	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.76
benzene	6.906	1211	220.79	1.73
2,2,4 TMP	6.812	1257.8	220.74	0.89
toluene	7.017	1377.6	222.64	0.51
ethylbenzene	6.95	1419.3	212.61	0.17
xylenes	7.009	1462.3	215.11	0.15
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08
ethyl alcohol {ethanol}	8.247	1670.4	232.96	1.06

MONTH August

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horizo		**I**	1640.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**530.15**	°R
Average daily maximum		T_{AX}	539.70	°R
Average daily minimum		T_{AN}	520.60	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	531.38	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**532.65**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	1.482	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.027	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00054	
benzene	78.11	49	0.00060	
2,2,4 TMP	114.23	49	0.00069	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00005	
xylenes	106.17	49	0.00020	
naphthalene	128.17	49	3.54E-07	
cumene	120.19	49	7.76E-06	
ethyl alcohol {ethanol}	46.07	49	6.57E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000452	1.482	0.00030	
benzene	0.000561	1.482	0.00038	
2,2,4 TMP	0.000440	1.482	0.00030	
toluene	0.000545	1.482	0.00037	
ethylbenzene	0.000031	1.482	0.00002	
xylenes	0.000136	1.482	0.00009	
naphthalene	2.00E-07	1.482	0.00000	
cumene	4.68E-06	1.482	0.00000	
ethyl alcohol {ethanol}	1.03E+00	1.482	0.69635	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.66
benzene	6.906	1211	220.79	1.66
2,2,4 TMP	6.812	1257.8	220.74	0.86
toluene	7.017	1377.6	222.64	0.49
ethylbenzene	6.95	1419.3	212.61	0.16
xylenes	7.009	1462.3	215.11	0.14
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.08
ethyl alcohol {ethanol}	8.247	1670.4	232.96	1.00

MONTH September

		Symbol		Units
Product Type			Denatured Ethanol (3% G	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horizo		**I**	1300.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**522.05**	°R
Average daily maximum		T_{AX}	531.70	°R
Average daily minimum		T_{AN}	512.40	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	523.03	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**524.03**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{VA}	1.149	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.021	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00056	
benzene	78.11	49	0.00062	
2,2,4 TMP	114.23	49	0.00071	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00019	
naphthalene	128.17	49	3.14E-07	
cumene	120.19	49	7.35E-06	
ethyl alcohol {ethanol}	46.07	49	6.36E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000364	1.149	0.00032	
benzene	0.000446	1.149	0.00039	
2,2,4 TMP	0.000347	1.149	0.00030	
toluene	0.000422	1.149	0.00037	
ethylbenzene	0.000023	1.149	0.00002	
xylenes	0.000102	1.149	0.00009	
naphthalene	1.37E-07	1.149	0.00000	
cumene	3.43E-06	1.149	0.00000	
ethyl alcohol {ethanol}	7.75E-01	1.149	0.67442	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	2.14
benzene	6.906	1211	220.79	1.32
2,2,4 TMP	6.812	1257.8	220.74	0.68
toluene	7.017	1377.6	222.64	0.38
ethylbenzene	6.95	1419.3	212.61	0.12
xylenes	7.009	1462.3	215.11	0.11
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.06
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.75

MONTH October

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		**I**	882.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**509.75**	°R
Average daily maximum		T_{AX}	519.00	°R
Average daily minimum		T_{AN}	500.50	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	510.41	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**511.10**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.771	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.014	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00059	
benzene	78.11	49	0.00064	
2,2,4 TMP	114.23	49	0.00072	
toluene	92.14	49	0.00069	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00018	
naphthalene	128.17	49	2.59E-07	
cumene	120.19	49	6.70E-06	
ethyl alcohol {ethanol}	46.07	49	6.03E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000259	0.771	0.00034	
benzene	0.000310	0.771	0.00040	
2,2,4 TMP	0.000238	0.771	0.00031	
toluene	0.000281	0.771	0.00036	
ethylbenzene	0.000015	0.771	0.00002	
xylenes	0.000064	0.771	0.00008	
naphthalene	7.60E-08	0.771	0.00000	
cumene	2.10E-06	0.771	0.00000	
ethyl alcohol {ethanol}	4.93E-01	0.771	0.63957	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.52
benzene	6.906	1211	220.79	0.92
2,2,4 TMP	6.812	1257.8	220.74	0.46
toluene	7.017	1377.6	222.64	0.25
ethylbenzene	6.95	1419.3	212.61	0.08
xylenes	7.009	1462.3	215.11	0.07
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.03
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.48

MONTH November

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		**I**	534.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**499.80**	°R
Average daily maximum		T_{AX}	507.40	°R
Average daily minimum		T_{AN}	492.20	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	500.20	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**500.61**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.550	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.010	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00062	
benzene	78.11	49	0.00066	
2,2,4 TMP	114.23	49	0.00073	
toluene	92.14	49	0.00068	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00017	
naphthalene	128.17	49	2.18E-07	
cumene	120.19	49	6.17E-06	
ethyl alcohol {ethanol}	46.07	49	5.75E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000194	0.550	0.00035	
benzene	0.000227	0.550	0.00041	
2,2,4 TMP	0.000172	0.550	0.00031	
toluene	0.000198	0.550	0.00036	
ethylbenzene	0.000010	0.550	0.00002	
xylenes	0.000043	0.550	0.00008	
naphthalene	4.57E-08	0.550	0.00000	
cumene	1.38E-06	0.550	0.00000	
ethyl alcohol {ethanol}	3.35E-01	0.550	0.60966	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	1.14
benzene	6.906	1211	220.79	0.67
2,2,4 TMP	6.812	1257.8	220.74	0.34
toluene	7.017	1377.6	222.64	0.18
ethylbenzene	6.95	1419.3	212.61	0.05
xylenes	7.009	1462.3	215.11	0.04
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.02
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.33

MONTH December

		Symbol		Units
Product Type			Denatured Ethanol (3% Gas)	
Vapor Molecular weight		M_v	**48.86**	
Vapor Pressure Equation Constant A		A	15.90	
Vapor Pressure Equation Constant B		B	8257.84	°R
Daily total solar insolation on a horiz		**I**	422.0	Btu/ft^2-day
Average Daily Ambient Temperature Eq. 1-30				
TAA = ((TAX+TAN)/2)		T_{AA}	**488.85**	°R
Average daily maximum		T_{AX}	495.60	°R
Average daily minimum		T_{AN}	482.10	°R
Liquid Bulk Temperature Eq 1-31:				
TB = TAA + 0.003 αs I		T_B	489.17	
Average Daily Liquid Surface Temperature Eq. 1-28				
TLA = 0.3*TAA + 0.7*TB		T_{LA}	**489.49**	°R
True Vapor Pressure Eq. 1-25:				
PvA = exp(A-(B/TLA))		P_{vA}	0.378	psia
Vapor pressure function Eq. 2-4:				
$P^*=P_{VA}/P_A/(1+(1-(P_{VA}/P_A$		**P***	0.007	NA
HAPS Speciation				
Product - select from list			Ethanol	
Vapor Weight Concent $Z_{Vi} = y_iM_i / M_V$				
	M_i	M_V	Z_{Vi}	
hexane	86.18	49	0.00065	
benzene	78.11	49	0.00068	
2,2,4 TMP	114.23	49	0.00074	
toluene	92.14	49	0.00067	
ethylbenzene	106.17	49	0.00004	
xylenes	106.17	49	0.00016	
naphthalene	128.17	49	1.79E-07	
cumene	120.19	49	5.58E-06	
ethyl alcohol {ethanol}	46.07	49	5.43E-01	
Vapor Mole Fraction Eq. 40-5 $y_i = P_i / P_{VA}$				
	$P_i = P_{VAi}(x_i)$	P_{VA}	y_i	
hexane	0.000140	0.378	0.00037	
benzene	0.000161	0.378	0.00043	
2,2,4 TMP	0.000120	0.378	0.00032	
toluene	0.000135	0.378	0.00036	
ethylbenzene	0.000006	0.378	0.00002	
xylenes	0.000028	0.378	0.00007	
naphthalene	2.58E-08	0.378	0.00000	
cumene	8.58E-07	0.378	0.00000	
ethyl alcohol {ethanol}	2.18E-01	0.378	0.57634	
Liquid Mole Fraction Eq. 40-4 $x_i = (Z_{Li}M_L)/M_i$				
	Z_{Li}	M_L	M_i	X_i
hexane	0.0003	48.86	86.18	0.00017
benzene	0.00054	48.86	78.11	0.00034
2,2,4 TMP	0.0012	48.86	114.23	0.00051
toluene	0.0021	48.86	92.14	0.00111
ethylbenzene	0.00042	48.86	106.17	0.00019
xylenes	0.0021	48.86	106.17	0.00097
naphthalene	0.0001245	48.86	128.17	0.00005
cumene	0.00015	48.86	120.19	0.00006
ethyl alcohol {ethanol}	0.97	48.86	46.07	1.02874
Component Vapor pressure P_{VAi}=(0.019337)10^(A-(B/(TLA+C)))				
	A	B	C	P_{VAi}
hexane	6.878	1171.5	224.37	0.82
benzene	6.906	1211	220.79	0.48
2,2,4 TMP	6.812	1257.8	220.74	0.23
toluene	7.017	1377.6	222.64	0.12
ethylbenzene	6.95	1419.3	212.61	0.03
xylenes	7.009	1462.3	215.11	0.03
naphthalene	7.146	1831.6	211.82	0.00
cumene	6.929	1455.8	207.2	0.01
ethyl alcohol {ethanol}	8.247	1670.4	232.96	0.21

Attachment IX

CLCPA

Global Companies LLC – Albany Terminal
50 Church Street
Albany, NY 12202

Climate Leadership and Community Protection Act Report

June 2023

Prepared for:

Global Companies LLC, 800 South Street, P.O. Box 9161, Waltham, MA 02454-9161 ph: 781-894-8800

Prepared by:

349 Northern Blvd. Suite 3
Albany, NY 12204

Envirospec Engineering Project E21-2818

Unauthorized alteration or addition to this
Document is a violation of Section 7209
Subdivision 2 of the New York State Education Law

© Copyright 2023
Envirospec Engineering

TABLE OF CONTENTS

1. Introduction

Global Companies LLC ("Global" or "Applicant") is submitting this report in response to the New York State Department of Environmental Conservation's (NYSDEC) March 28, 2023 Request for Additional Information. In the request, NYSDEC asked Global to provide an analysis of greenhouse gas (GHG) emissions associated with Global's pending Title V permit renewal and modification application following the procedures outlined in the DAR-21 guidance document entitled, "The Climate Leadership and Community Protection Act (CLCPA) and Air Permit Applications," which was issued on December 14, 2022. Global previously submitted several analyses addressing consistency with the CLCPA, dated July 7, 2020, December 3, 2020, and March 2, 2021, respectively. This report incorporates the previous submittals and expands upon the information provided in accordance with the current guidance per DAR-21. The NYSDEC also requested a Disadvantaged Communities analysis under CLCPA Section 7(3) because the Terminal (defined below) is located in a Disadvantaged Community.

2. Proposed Changes to the Facility

The following modifications are being proposed as set forth in Global's Title V permit renewal/modification application. These changes to the Global facility located at 50 Church Street, Albany, New York 12202 (the "Terminal" or "Facility") collectively constitute the "Project".

- Reduce allowable crude oil throughput from 1,850 to 450 million gallons (a 1,400 million gallon reduction, or about 75%) while reducing overall product throughput at the Terminal by 950 million gallons (a 27% reduction);
- Install exempt natural gas-fired boilers/heaters to enable the Terminal to manage biodiesel;
- Revise the Terminal's existing throughput caps to give Global greater flexibility to respond to market changes;
- Accept stricter emissions limits on the Terminal's existing air pollution controls;
- Install a new vacuum assist system ("vac assist") to reduce, if not eliminate, fugitive emissions at the railcar loading rack; and
- Add loading positions at the truck and railcar loading racks to reduce unnecessary truck idling and locomotive use, respectively.

In addition, during discussions with NYSDEC staff, Global committed to various measures designed to limit emissions of volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) during tank landing and cleaning events.

Additional details concerning the Project are set forth below.

Throughput Reductions

As part of the renewal, Global is proposing to reduce its throughput cap of crude oil from 1,850 million gallons to 450 million gallons and increase its throughput cap of refined products (gasoline, ethanol, blendstocks, distillates, and biodiesel) from 1,479 million gallons to 1,929 million gallons. This would lead to a net decrease of 950 million gallons of overall throughput at the Terminal.

New Exempt Heaters and Boilers
Global is proposing to install new exempt natural gas-fired boilers/heaters to allow the facility to handle biodiesel. As set forth in greater detail below, although the boilers will increase direct GHG emissions at the Terminal, the Project will support the New York mandate for inclusion of biodiesel in heating oil and result in a significant reduction in overall GHG emissions based on the lifecycle GHG emission reductions associated with the substitution of biomass-based diesel for petroleum diesel. This measure is discussed further in Section 4.

Operational Flexibility
Currently, loading of gasoline and ethanol at the Terminal is capped at each of three loading areas: the truck loading rack, the rail loading rack, and the marine dock. Loading of distillate products (including diesel fuel, heating oil and kerosene) is capped on a facility-wide basis. The Project includes the addition of a facility-wide cap that incorporates all refined products (including gasoline, ethanol, distillates, blendstocks, and biodiesel) as well as a reconfiguration of the existing sub-caps at each of the loading areas. This reconfiguration of the caps will allow flexibility in the type and volume of products distributed at the individual loading areas to adjust to changing market conditions, while ensuring against major changes in truck or rail traffic.

Enhanced Air Emission Controls
Global is proposing to reduce the allowable emission rate at the rail loading rack from 18 mg/L to 2 mg/L to reduce emissions from rail loading. A vac assist will be installed at the rail loading rack to ensure negative pressure loading, which will significantly reduce, if not eliminate, fugitive emissions of VOCs and HAPs from rail loading. Also, as part of this change, the rail rack will be equipped with a continuous parameter monitoring system (CPMS) to monitor the temperature of the vapor combustion unit (VCU) while loading. The Project will also reduce the emissions limit applicable to most loading that occurs at the marine dock from 3 mg/l to 2 mg/l.

Loading Rack Modifications
Global is proposing to add loading positions to its truck loading rack to reduce truck wait times and the related emissions associated with truck idling (in particular, HAPs and particulate matter [PM]). Currently, the truck loading rack is equipped with eight loading positions. Operation of the truck loading rack can become congested and constrained during daily busy periods. The Project includes the addition of two loading positions at the truck loading rack to improve efficiency and reduce customer wait time and truck idling time.

Global also is proposing to add seven loading positions at the rail loading rack. The loading rack area can currently store up to 15 rail cars but can only load into eight railcars at one time. Because of the current configuration, an initial locomotive movement is required to place half of the cars at the rack and the other half in Canadian Pacific's Kenwood Yard. Once the initial group of cars are loaded, a second locomotive movement is required to move the loaded cars into Kenwood Yard and place the empty cars at the rail loading rack. When the second group of cars is loaded, yet another locomotive movement is required to move the loaded cars to Kenwood Yard and connect them to the previously loaded cars for shipment to the final destination. The seven additional loading positions will reduce transportation-related emissions by reducing the number of locomotive movements and associated locomotive emissions required to fill each delivery of railcars. The seven additional loading positions also will reduce the need to store cars in Kenwood Yard, which has been a subject of concern in the community in the past.

3. Greenhouse Gas Emissions

DAR-21 requires Title V permit applicants to quantify potential and actual GHG emissions from the project under review. This analysis must include both direct emissions (i.e., emissions from the facility) and "upstream" emissions (i.e., emissions attributable to the production, transmission, and use of fossil fuels or imported electricity). DAR-21 also requires applicants to address indirect and downstream emissions from the project as defined in the guidance.

As set forth below, the increase in GHG emissions from the Project results from the use of the exempt heaters and boilers necessary to allow the Facility to handle biodiesel. GHG emissions associated with the Project are summarized below. The potential emissions as well as projected actual emissions are presented and discussed in accordance with DAR-21.

3.1 Potential GHG Emissions

Current GHG emissions at the Terminal can be attributed to combustion in a few small heaters for the offices, natural gas used as assist gas for the VCUs, and the petroleum vapors combusted by the VCUs. Calculations for current GHG emissions at the Facility are included in Attachment 1 and calculations for future GHG emissions associated with the Project are included in Attachment 2. Potential emissions for the new boilers and heaters assume 24 hours a day, 7 days a week of operation, which far exceeds the projected actual usage of 25 percent. Calculations for CO_2e were performed using the 20-year global warming potentials from 6 NYCRR 496.5. Only methane, nitrous oxide, and carbon dioxide were included in the analysis because they are the only GHGs expected to be emitted from the Facility.

Table 1: Potential Direct Emissions

GHG	Current (TPY)	Future (excluding Boilers/Heaters) (TPY)	Future (Boilers/Heaters) (TPY)	Total Future (TPY)	Total Increase (TPY)
CO_2	18,815.92	17,132.60	27,619.76	44,752.36	25,936.44
CH_4	0.55	0.53	0.53	1.06	0.51
N_2O	0.55	0.51	0.51	1.02	0.47
CO_2e	19,008.51	17,312.56	27,797.91	45,110.48	26,101.97

Note that the estimate of future potential GHG emissions from the Facility excluding the boilers and heaters shows a decrease. This decrease is because the previous Potential to Emit (PTE) was overly-conservative in its estimate of assist gas usage. Since the overall Terminal throughput is being reduced, overall potential assist gas usage will decrease at the Terminal, decreasing GHG emissions associated with the VCUs.

The upstream emissions included with this submission have been updated using the emission factors from the 2022 NYS Statewide GHG Emissions Report Appendix: Emission Factors for use by State Agencies and Applicants. The upstream emissions include the emissions associated with the extraction, transmission, and use of fossil fuels that are combusted at the Terminal. Global does not know whether the Project will use power imported into the State. As a result, the analysis does not include upstream emissions associated with the use of imported electricity.

Table 2: Potential Upstream GHG Emissions

GHG	Current (TPY)	Future (excluding Boilers/Heaters) (TPY)	Future (Boilers/Heaters) (TPY)	Total Future (TPY)	Total Increase (TPY)
CO_2	2,804.24	2,131.49	6,317.52	8,449.01	5,644.78
CH_4	78.30	59.01	181.15	240.16	161.86
N_2O	0.03	0.02	0.07	0.10	0.06
CO_2e	9,390.08	7,094.90	21,553.35	28,648.25	19,258.17

The potential increase from both direct and upstream emissions from the Project are as follows:

Table 3: Total Potential Increase in Direct and Upstream Emissions

GHG	Total Increase (TPY)
CO_2	31,581.22
CH_4	162.37
N_2O	0.53
CO_2e	45,360.14

3.2 Projected Actual GHG Emissions

Actual GHG emissions at the Facility are expected to increase due to the use of the exempt natural gas-fired boilers and heaters needed to allow the Facility to handle biodiesel. Global anticipates that emissions from the heaters and boilers will be less than 25% of potential emissions (typically usage is higher when the weather is cold, causing the viscosity of the biodiesel to increase). The projected actual emissions for direct and upstream GHG emissions from the heaters and boilers were calculated using this assumption and are shown below.

Calculations for the projected actual GHG emissions for the heaters and boilers are included in Attachment 3.

Table 4: Projected Actual Direct GHG Emissions

GHG	Current (TPY)	Future (excluding Boilers/Heaters) (TPY)	Future (Boilers/Heaters) (TPY)	Total Future (TPY)	Total Increase (TPY)
CO_2	18,815.92	17,132.60	6,904.94	24,037.54	5,221.62
CH_4	0.55	0.53	0.13	0.66	0.11
N_2O	0.55	0.51	0.13	0.64	0.09
CO_2e	19,008.51	17,312.56	6,949.48	24,262.04	5,253.53

349 Northern Blvd, STE 3 ▪ Albany, NY 12204 ▪ Phone: 518.453.2203 ▪ Fax: 518.453.2204

The upstream emissions below were also adjusted to account for the fact that the heaters will only be used for one quarter of their potential capacity.

Table 5: Projected Actual Upstream GHG Emissions

GHG	Current (TPY)	Future (excluding Boilers/Heaters) (TPY)	Future (Boilers/Heaters) (TPY)	Total Future (TPY)	Total Increase (TPY)
CO_2	2,804.24	2,131.49	1,579.38	3,710.87	906.64
CH_4	78.30	59.01	45.29	104.30	26.00
N_2O	0.03	0.02	0.02	0.04	0.01
CO_2e	9,390.08	7,094.90	5,388.34	12,483.24	3,093.16

The projected actual increase from both direct and upstream emissions from the Project are as follows:

Table 6: Total Projected Actual Increase in Direct and Upstream Emissions

GHG	Total Increase (TPY)
CO_2	6,128.26
CH_4	26.11
N_2O	0.10
CO_2e	8,346.69

3.3 Downstream and Indirect GHG Emissions

According to DAR-21, downstream emissions are emissions resulting from the transmission and use of natural gas or fossil fuels while indirect emissions are emissions that are a consequence of activities at the reporting facility that may occur at sources owned or controlled by another entity (such as truck traffic).

The Project is not expected to increase downstream GHG emissions because the overall throughputs at the Facility will decrease as a result of the Project.

With respect to indirect emissions, the throughput cap at the truck loading rack is unchanged as a result of this Project. Accordingly, indirect emissions associated with truck traffic are not expected to increase as a result of the Project. The change in the throughput cap at the rail loading rack to include both distillate product and gasoline is also not anticipated to increase rail traffic associated at the rack. In fact, the Project may reduce indirect GHG emissions associated with vehicle operations at the Terminal. As set forth above, the addition of loading positions at the truck rack should reduce customer wait times and the related emissions associated with truck idling. Similarly, the addition of loading positions at the rail rack will reduce the amount of train movements required when loading tanker cars, reducing locomotive emissions associated with the Facility's rail loading activities.

3.4 Projected Future GHG Emissions for 2030 and 2050

Assuming no further changes to the Terminal, potential GHG emissions will remain the same throughout the relevant period. Actual GHG emissions will likely decrease over time as technology improves and the use of fossil fuels in the state decreases. For biodiesel, although there is an increase in the percentage of biodiesel required in diesel fuel per New York State law, the allowable throughput through the Terminal will not change, and therefore potential emissions will not increase. In addition, it is expected that future mandates can be met assuming the 25% usage rate of the heaters and boilers, and therefore no increase in projected actual emissions is anticipated.

4.0 Consistency with CLCPA

As set forth below and in the previous submissions, the GHG emission reduction benefits associated with facilitating the transition from petroleum to biomass-based diesel are consistent with the GHG emission reduction goals of the CLCPA. Although the boilers will increase direct GHG emissions at the Terminal, the Project will result in a significant reduction in overall GHG emissions based on the lifecycle GHG emission reductions associated with the substitution of biomass-based diesel for petroleum diesel and will help support the 2021 New York law mandating an increasing percentage of biodiesel in fuel oil. This benefit was discussed in detail in the previous CLCPA submissions, which are included as Appendix A and summarized in the following section. Note that some of the calculations provided in previous submittals have been updated and included in this submittal based on additional guidance provided in DAR-21.

4.1 CLCPA Implications of Biodiesel Component of Project

The majority of the increase in GHG emissions associated with this Project is related to the management of biodiesel at the Terminal. Biodiesel production and use of biofuel are encouraged by both federal and state programs, in large part because of its climate change benefits. Of particular note, on December 23, 2021, New York Governor Kathy Hochul signed into law legislation (S.3321-A/A.7290) that requires all heating oil sold for use in any building in New York State to contain at least 5% biodiesel by July 1, 2022. The requirement increases to 10% starting in July 2025 and 20% in 2030. This legislation is a step toward meeting the State's CLCPA goal of reducing GHG emissions.

As discussed in Global's earlier submissions, analyses of fuels regulated under EPA's Renewable Fuel Standards (RFS) program show that biomass-based diesel and renewable fuels as defined under the RFS program emit significantly less GHGs than the petroleum-based diesel they replace when measured on a lifecycle basis. To qualify as "biomass-based diesel" under the RFS program, the producer/importer must show that the particular type of diesel fuel has lifecycle GHG emissions that are at least 50% lower than comparable petroleum diesel. To qualify generally as "renewable fuel," the fuel must have lifecycle GHG emissions that are at least 20% less than the baseline fuel it replaces. See 40 CFR § 80.1401 for the relevant definitions. The lifecycle analysis includes all GHG emissions associated with the production of each type of fuel, including those associated with fuel production and transmission. In other words, the GHG emissions DEC has asked Global to quantify as part of its CLCPA analysis are already part of the assessment performed by EPA under the RFS program. EPA thus has already accounted for these emissions in deciding whether fuels achieve the GHG reductions necessary to qualify as renewable under the RFS program.

The GHG emissions associated with the boilers and heaters needed to manage biodiesel at the Terminal are more than offset by the broader climate change benefits of biodiesel versus petroleum diesel. The GHG lifecycle emission data presented previously demonstrates that on a per gallon basis, each gallon of biodiesel loaded emits approximately 6 lbs of lifecycle carbon dioxide equivalent (CO_2e) emissions less than comparable petroleum-based diesel. The analysis shows that Global needs to only replace approximately 19 million gallons of petroleum-based diesel throughput per year with biodiesel to offset the maximum added boiler/heater GHG emissions and achieve emission reductions of CO_2e equivalent to a 40% reduction from pre-Project baseline emissions at the Terminal. If 50 million gallons of biodiesel throughput replaced petroleum-based diesel, the GHG lifecycle emissions would be reduced by 149,380 tons per year (tpy) of CO_2e. The more biodiesel the Terminal handles, the greater the benefits of the Project from a climate change perspective. For this reason, the Project is consistent with the CLCPA goal of reducing GHG emissions 40% from 1990 levels by 2030.

4.2 Discussion of Alternatives

As set forth below, there are no alternatives to the Project that will reduce GHG emissions.

4.2.1 No Action Alternative

This Project is required to help New York State meet the legislative mandate for increased biodiesel. In addition, there are significant components of the Project that will benefit the nearby community, including the installation of additional emission controls, the reduction in allowable crude oil and total throughput, and the changes in loading operations targeted at reducing indirect emissions from truck and rail traffic at the Terminal.

4.2.2 Electric Heaters/Boilers

The boilers are proposed to be fired using natural gas. Global has investigated the option of installing electric heating in place of the planned natural gas-fired boilers. However, due to the riveted construction of the storage tanks, substantial tank modifications would be required to use electric heat. Global's assessment of the modifications required suggested that the modifications could threaten the structure integrity of the tanks. As a result, the use of electric instead of natural gas-fired boilers and heaters is not a technically feasible alternative.

4.2.3 VCUs for Marine and Rail Loading

The vast majority of the existing GHG emissions relating to current Terminal operations are linked to operation of the VCUs. The VCUs reduce emissions of VOCs and HAPs, from the Terminal and ensure that the marine loading operations comply with Coast Guard requirements relating to explosion prevention. Vapor recover units (VRUs) are not typically used for marine or rail loading due to the technology limitations of high vapor loads from barges and rail cars. This Project will install vacuum assisted loading at the rail rack, which will significantly reduce fugitive VOC and HAP emissions from this operation. Also, as part of the Project, Global will reduce the permitted emissions limit applicable to most loading that occurs at the marine dock from 3 mg/l to 2 mg/l.

4.2.4 Operational Flexibility Improvements

The Facility changes targeted at improving operational flexibility (in particular, the revision of throughput caps) do not require Global to purchase new equipment, modify existing equipment, or alter operations in ways that would impact GHG emissions. Accordingly, this aspect of the Project provides limited opportunities for Global to implement alternatives to reduce GHG emissions.

4.3 Climate Change and Environmental Benefits of the Project

As outlined above, the GHG emissions associated with the Project are comparatively minor. The Project will benefit the climate by reducing overall GHG emissions associated with the management and use of biodiesel. The reductions in GHG emissions associated with facilitating the switch from petroleum diesel to biodiesel more than offset the increases in GHG emissions associated with the boilers/heaters included in the Project. Viewing these considerations together, the Project is clearly justified from a climate change perspective. However, the Project has additional environmental and other benefits that justify approval. The climate change and environmental benefits of the Project are summarized below:

- Installing the proposed boilers/heaters associated with the Project will generate an immediate climate change benefit by facilitating management of biodiesel, a more climate-friendly fuel, as the State transitions to a reduced carbon future under the CLCPA. NYSDEC, in approving the proposed boilers/heaters, will further the goals of the CLCPA and allow the expanded use of biodiesel as a transitional substitute fuel for petroleum-based diesel. The portion of the Project targeted at facilitating the management of biodiesel will likewise help the State to reduce reliance on fossil fuels by encouraging a switch to biodiesel. Although operation of the boilers/heaters needed to manage biodiesel will result in increased direct emissions and upstream GHG emissions, the climate benefits associated with managing biodiesel in light of the significant lifecycle benefits of biodiesel relative to petroleum diesel more than outweigh these costs.
- As noted above, the Project will reduce allowable crude oil throughput at the Terminal by 1,400 million (1.4 billion) gallons (75%) and overall allowable Terminal throughput by 950 million gallons (27%). These changes are consistent with the CLCPA goal of reducing reliance on fossil fuel.
- The change in the Terminal's throughput caps will improve operational flexibility as well as Global's ability to respond quickly to changes in the fuel market, many of which will be driven by efforts to implement the CLCPA and handle low-carbon fuels.
- As noted above, the Project calls for stricter emission limits on the Terminal's existing air pollution controls as well as installation of vac assist at the rail rack to reduce, if not eliminate, fugitive emissions from rail loading. Approval of the Project means the Terminal will have a 2 mg/L limit set for each primary control device along with vacuum enhanced loading at each loading rack (with a limited exception for some loading circumstances at the marine dock to comply with USCG requirements). The installation of vac assist and the acceptance of lower emission rates for various control devices will reduce emissions of VOCs and HAPs, such as benzene, to the benefit of the environment and the Disadvantaged Community.

- As discussed above, the addition of loading positions at the truck and railcar loading racks will reduce unnecessary truck idling and railcar movement, respectively, thus decreasing vehicle emissions, including, PM, nitrogen oxides, HAPs, and other pollutants. The changes thus will benefit both the environment and the Disadvantaged Community.
- The Terminal uses a continuous emissions monitoring system at the truck loading rack with a shut-down value set as a one-hour average and not the allowable six-hour average. This is a more stringent requirement to ensure the emission limit is never exceeded.
- In conjunction with the Project, extensive air dispersion modeling has been completed to understand the impacts of benzene and other HAP emissions from Terminal activities. The modeling results will be used by Global to minimize emissions from tank maintenance activities. Tank cleanings will be controlled, and tank landings will be minimized to reduce VOC and HAP emissions and minimize impacts to the community.

These measures will benefit air quality generally and reduce potential impacts to those living near the Terminal, including the Disadvantaged Community.

5.0 Section 7(3) Disadvantaged Community Analysis

The Project will not disproportionately burden the Disadvantaged Community. In fact, benefits of the Project and proposed community benefit measures far outweigh "costs" associated with the modest increases in GHG emissions associated with the Project.

The Terminal is located in a Disadvantaged Community as defined pursuant to the CLCPA by the Climate Justice Working Group. CLCPA Section 7(3) provides that NYSDEC—when considering permits and other approvals under the statute— "shall not disproportionately burden disadvantaged communities" as identified under the statute. Section 7(3) also requires NYSDEC to prioritize reductions of greenhouse gas emissions and co-pollutants in disadvantaged communities, with co-pollutant defined in the statute as "hazardous air pollutants produced by the greenhouse gas emission sources" (ECL 75-0101.3). Consistent with that mandate, Global has: (1) evaluated whether the Project will impose a disproportionate burden on the Disadvantaged Community; (2) assessed the impact of the Project on co-pollutant emissions; (3) provided an overview of Global's current community involvement efforts; and (4) identified additional measures proposed to address the climate change and co-pollutant impacts of the Project.

5.1 Project Benefits

The Project proposes several benefits as outlined in the sections below.

5.1.1 Reduction in Potential Crude Oil and Total Throughput

In the past, members of the South End community have expressed concerns about the management of crude oil at the Terminal. The Project will reduce potential crude oil throughput at the Terminal by approximately 75%, from 1,850 million gallons to 450 million gallons, a 1,400 million gallon decrease. Total potential throughput for all products at the Terminal will decrease by 950 million gallons.

5.1.2 Improved Emission Controls and Associated Reductions in VOC and HAP Emissions

As previously discussed, the Project includes installation of additional controls at the rail loading rack to eliminate fugitive emissions from loading. Also, Global has committed to accepting stricter emission limits on the Terminal's existing air pollution controls. These changes will decrease VOC and HAP emissions from the Terminal to the benefit of the Disadvantaged Community.

5.1.3 Transportation-related Benefits

The addition of two loading positions at the truck loading rack will make loading more efficient and reduce truck wait times. Currently, the truck loading rack is equipped with eight loading positions. Operation of the truck loading rack can become congested and constrained during daily busy periods. The Project includes the addition of two loading positions at the truck loading rack to improve efficiency and reduce customer wait time and truck idling time and the associated PM, HAP and other emissions.

The addition of seven loading positions at the rail loading rack will improve efficiencies at the rack resulting in reductions in locomotive use and reducing or eliminating the need to temporarily store railcars at CP's Kenwood Yard during the loading process. While 15 cars can fit at the loading rack, only eight cars can be loaded at one time. By providing loading positions for all 15 cars, a locomotive will not be required to switch cars to complete the loading process. This will reduce locomotive use and associated PM, HAP, and other emissions. Since all 15 cars will be able to be placed at the loading rack, the car storage in Kenwood Yard will be reduced, addressing community concerns regarding railcar storage.

5.1.4 Other Facility Changes

Global has committed to controlling emissions from tank cleaning operations, which will significantly reduce short-term VOC and HAP emissions. Also, extensive air dispersion modeling has been completed as part of Global's Title V air permit application addressing both day-to-day operations and tank landings and cleanings. To minimize VOC and HAP emissions associated with tank landings, Global has committed to evaluating each internal floating roof landing in advance to minimize the potential for short-term emissions.

Collectively, these changes will reduce the potential impacts of the Terminal on the Disadvantaged Community and ensure that the Terminal does not impose a disproportionate burden on that community.

5.2 Evaluation of Co-Pollutants

Section 7(3) requires an evaluation of co-pollutant emissions (defined as HAPs produced by GHG emission sources).

According to ASTM standard D6751, biodiesel may contain up to 0.2% methanol; by comparison, methanol is not a significant component of the products currently managed at the Terminal. Global estimates that potential emissions of methanol may increase approximately 5 tpy following implementation of the Project. Note, however, that the assumptions underlying the potential to emit methanol are highly unrealistic. The PTE was calculated assuming a throughput of 1,548 million gallons of biodiesel because of the flexible throughput cap structure of the permit. Realistically, the Terminal's ability to manage biodiesel is constrained by transportation limits, offloading capacity, tank capacity, and other factors to a maximum of approximately 300 million gallons annually, meaning maximum emissions associated with the planned biodiesel operation are far below the potential estimates.

Global estimates non-methanol HAP emissions from the Facility before and after the Project as follows:

Table 7: Potential Maximum Co-Pollutant Emissions Excluding Methanol

Pollutant	Pre-Project PTE (TPY)	Post Project PTE (TPY)
Total Non-Methanol HAPs	7.05	9.31
hexane	1.81	3.01
benzene	0.95	0.54
2,2,4-TMP	1.07	0.61
toluene	1.56	1.65
ethylbenzene	0.25	0.26
xylenes	1.40	3.19

However, calculations for the PTE are completed using overly conservative assumptions. As a result, actual co-pollutant emissions are expected to be lower than what is shown in the table above.

As part of its Title V permit application, Global conducted an Air Guide-1 analysis of HAPs emitted in quantities above the mass emission limit in 6 NYCRR 212-2.2. This analysis shows that emissions of co-pollutants required to be modeled (benzene, toluene, ethylbenzene, xylene 2,2,4-TMP and hexane) are all well below the applicable annual and short-term guideline concentrations with the exception of benzene. As discussed in this submittal, additional operational requirements will be implemented to mitigate benzene emissions and the Project as a whole will reduce benzene emissions from approximately 0.95 tpy to 0.54 tpy. Accordingly, emissions of these pollutants will not impose a disproportionate burden on the Disadvantaged Community.

5.3 Current Community Involvement

Global has a long track record of community involvement in and around Albany. This work is led by Mark Bobb-Semple, Global's full-time community liaison based out of Albany. Mark has been with Global since 2019 and has decades of experience in community engagement and nonprofit work in Albany.

Mr. Bobb-Semple meets regularly with community leaders, elected officials, and residents, including residents of the Ezra Prentice housing complex located near the Terminal. He also convenes meetings between community members and Global leadership.

To improve the public's understanding of Global's operations in Albany, Global conducts periodic tours of the Terminal, meets with community members, and maintains a public website with current information about the Terminal and the pending permit renewal/modification at www.globalalbany.com. The goal of Global's community outreach efforts is to listen to potential concerns from community members, address and mitigate issues whenever possible, and share current information about Global's operations.

To ensure the communities adjoining the Terminal are provided with opportunities to learn about and comment on the Project, Global has prepared a comprehensive public participation plan (PPP) to facilitate community outreach. The PPP is part of a larger Global initiative to reach out to and engage with the community.

Global also provides direct support to benefit the local community, particularly residents in the South End of Albany and Disadvantaged Community. These efforts focus on a range of sectors including education, youth services, public safety, economic development, and more.

Since January 2020, Global has donated over $86,00 to local organizations. Global has had the opportunity to support the following non-profit organizations:

Albany Community Outreach
Albany High School
Albany Lady Falcons Basketball Club
Albany Police & Fire Foundation
Albany Police Athletic League, Inc
Albany Pop Warner
AVillage Inc.
Boys & Girls Clubs of Albany
Christ's Church Albany
Homeward Bound Dog Rescue of New York Ltd.
Just Be Ready
Lark Street BID
Noteworthy Resources of Albany
NYS Odyssey of the Mind
The College of Saint Rose
Trooper Foundation-State of New York Inc
Ujamaa Market

Below is a partial list of the programs Global has supported since 2020:

Boys & Girls Club of Albany

- Global helped start a Boys & Girls Club of Albany program at Ezra Prentice Programs. This program provides after school support, teen-focused courses, and virtual-learning support at Ezra Prentice.

- Global supports other Boys & Girls Club programs like Friday Teen Night, summer and fall scholastic basketball programs, and the Club STEAM initiatives.
- Global provides ongoing support for food programs overseen by the Boys & Girls Club. Global knows there is an ongoing need for fresh and healthy food in Albany and supports the Club's work providing meals to the community through donations from Global's Alltown Fresh® convenience market in Schenectady.
- Global provides fuel for Boys & Girls Club vans.
- Global Community Liaison Mark Bobb-Semple serves on the board of the Boys & Girls Club.

Other Community Support

- Global co-hosted an Earth Day community cleanup and cookout with music and conversation at Ezra Prentice Homes. Global sponsored this event with their partner, the Boys & Girls Club of Albany, as well as Albany Housing Authority.
- Global partners with Giffen Memorial Elementary School in the South End supporting their community school advisory board.
- Global supports the street outreach organization, Just Be Ready with their "Grab and Go" meal delivery program to neighbors in Albany's South and North End.
- Global employees volunteer with the Lark Street Business Improvement District to help with the beautification of Lark Street.
- Global sponsors the Ujamaa Market**,** a market where predominantly Black-owned small businesses sell artisan goods.

$2 Million to Provide Heating Oil to Families in Need

In addition to ongoing targeted local support, in December 2022, recognizing the unprecedented uncertainty and challenges in the energy market, Global donated $2 million in heating oil for those in need. The donation was directed to seven states in the Northeast and distributed to local nonprofit entities serving low-income households.

- $1.3 million was evenly split between Massachusetts and New York.
- An additional $700,000 was split between Connecticut, Maine, New Hampshire, Rhode Island, and Vermont.
- This $2 million donation provided heating fuel to warm an estimated 4,000 households in the Northeast during the winter of 2022-23.

5.4 Proposed Community Benefit Measures in Association with the Project

As the discussion above shows, Global is already implementing a rigorous community outreach and benefits program, much of which is targeted at the South End neighborhood and Disadvantaged Community adjoining the Terminal. In conjunction with the Project, Global is proposing to pursue the following additional measures:

- **Electric Van and Charging Station –** Global has committed to providing an electric van and charging station to a local non-profit. The van would be used to support activities in the local community and to reduce transportation-related emissions (GHGs, PM and

VOCs) that have been identified as a concern.[1]

- **West Tank Farm Solar Project –** Global has entered into an agreement with a partner to repurpose 6.3 acres of the West Tank Farm for a solar project. The solar project is designed to dedicate a significant portion of the West Tank Farm to renewable energy and will benefit the local community in the following ways:
  - Financial - This solar project will provide approximately $70,000 per year for 20 years ($1,400,000 total) in electric bill savings to targeted participants.
  - Environmental - This solar project will offset the need for electricity generation from fossil fuel plants and produce no emissions. The environmental benefits associated with this project are equivalent to the elimination of 2,200 metric tons of CO_2, which is akin to removing 500 cars from the road or eliminating the combustion of 250,000 gallons of gasoline EACH year. The emission-free electricity from the solar project is enough to power 430 homes annually.
  - Low Income Focus - This project will focus on providing benefits to low income households. This is a group that typically can't participate in the benefits of solar energy and spends a disproportionate amount of their monthly budget on energy bills.

- **South End STEM Programs -** Global has a deep commitment to supporting K-12 STEM education. In Albany, that priority is expressed through the company's financial and volunteer support of the local Giffen Memorial Elementary School and the local Boys and Girls Club.
  - Giffen Elementary School - In addition to general support for the school, Global will continue to support a summer intensive STEM program for K-5 that is offered to students who meet specific academic growth criteria.
  - Boys and Girls Club - In addition to general and program-specific assistance for the Club, Global will continue to support the Ultimate Journey program (outdoor and nature learning) as well as the club's STEM afterschool programming.

  Support of STEM education aligns with the recommendations from the 2019 Albany South End Community Air Quality Study. Global recognizes the important impact of STEM education on childhood learning and development. Global is in ongoing dialogue with Giffen School and Boys and Girls Club to look for ways to engage more deeply in supporting STEM learning throughout the year.

- **Albany Internship Program -** Global has launched an internship program at the Albany

[1] Over the years, residents of Ezra Prentice have expressed concerns about the impact of truck traffic on South Pearl Street on local air quality. However, as summarized in the Environmental Assessment Form (EAF) Supplement accompanying the original Title V air permit application several traffic studies, including one conducted by Global, show that the Terminal does not contribute significantly to traffic on this section of South Pearl Street and so is not a major contributor to the traffic-related air emissions concerns identified by South End residents. Moreover, Global lacks authority to dictate travel patterns outside the confines of the Terminal. As set forth above, Global is addressing vehicle emissions within the Facility by increasing the number of loading positions at the truck and rail racks.

Terminal. Two interns were recently hired. They will work full-time (40 hours per week) for six months and will be compensated $18/hour for their work.

Global is actively working to diversify those working in energy and terminal operations, with a specific focus on recruiting women and people of color, and has partnered with community groups to create a diverse candidate pool. The current interns are from Albany, and one is from the South End.

The interns will rotate through different departments at the Global Albany Terminal, learning all facets of terminal operations. The goal is to have them be qualified and competitive for future employment in the field.

Global intends to continue this internship program in Albany, hiring 1-2 interns per year.

6.0 Conclusion

Although there is a small increase in GHG emissions associated with the proposed Project, the benefits of the Project far outweigh this cost. The Project will reduce allowable crude oil throughput at the Terminal by 1,400 million (1.4 billion) gallons (75%) and overall allowable Terminal throughput by 950 million gallons (27%). These changes are consistent with the CLCPA goal of reducing reliance on fossil fuel. The portion of the Project targeted at facilitating the management of biodiesel will help the State to reduce reliance on fossil fuels by encouraging a switch to biodiesel. Moreover, the climate benefits associated with managing biodiesel given the lower lifecycle GHG emissions of biodiesel relative to petroleum diesel more than outweigh the direct and upstream emissions resulting from the Project. Finally, as set forth above, the Project calls for numerous measures, including installation of emission controls and acceptance of lower VOC emission limits, that will reduce emissions of VOCs and HAPs to the benefit of the environment and Disadvantaged Community. Global also has committed to expanding its roster of community benefit projects to include donation of an electric van and charging station to a local not-for-profit group, dedicating a significant portion of the West Tank Farm to a solar project, continued support of STEM programs, and implementation of an internship program at the Albany Terminal.

Attachment 1

Pre-Project GHG Emissions Calculations

Fuel Combustion Emissions

Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Distillate	Furnace	590			–
NA	Natural Gas	Boiler (water bldg	–			54
NA	Natural Gas	Boiler (garage)	–			22
NA	Natural Gas	Boiler (office)	–			163
NA	Natural Gas	Furnace	–			120

Non-Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
VCUML/VCUM2/VCURR*	Natural Gas	VDU	–			200,000

*Includes natural gas used as assist gas for both marine VCUs (VCUML and VCUM2) and the rail VCU (VCURR)

Distillate Combustion Emissions:

	Combustion Emissions								
Pollutant	PM	SOx	NOx	VOC	CO	CO2	N2O	CH4	GHG**
Emission Factor - lb/1000 gal*	2.00	0.21	20.00	0.20	5.00	2.2E+04	0.26	0.22	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1.18	0.13	11.80	0.12	2.95	13157.00	0.15	0.13	13,208.40
tons/yr	0.00	0.00	0.01	0.00	0.00	6.58	0.00	0.00	6.60

* Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I. SOx, Nox, CO, and PM Emission Factors are from Table 1.3-1. VOC Emission Factor is from Table 1.3-3. CO2 Emission Factor is from Table 1.3-12.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (25), and N2O (298)

Example calculation (using SOx):
= gal/yr / 1000 gal * Emission Factor
= 590 gal/yr / 1000 gal * 52.54 lb/1000 gal (SOx)
= 31.00 lb/yr

Natural Gas Combustion Emissions*:

	Combustion Emissions								
Pollutant	PM	SOx	NOx	VOC	CO	CO2	N2O	CH4	GHG***
Emission Factor - lb / MM BTU**	0.0075	0.00059	0.098	0.0054	0.082	117.647	0.002254902	0.002156863	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1,492.87	117.86	19,643.04	1,080.37	16,500.15	23,571,647.06	451.79	432.15	23,727,219.93
tons/yr	0.75	0.06	9.82	0.54	8.25	11,785.82	0.23	0.22	11,863.61

*Total emissions from natural gas combustion 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 are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Tables 1.4-1, 1.4-2, and 1.4-3, except for GHG.

*** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (25), and N2O (298).

Total Natural Gas Used 200,359 MMBTU/yr

Example Calculation (using SOx):
= Total Natural Gas Used * Emission Factor
= Total Natural Gas Used (200,359) MMBTU/yr * 0.00059 lb / MM BTU
= 458 lb/yr

VCU Vapor Combustion Emissions
(Emissions from Combustion of Petroleum Product Loaded)

Petroleum Vapor Combusted (lbs):

5,217,583 Total
1,755,000 at VCUML (gasoline and ethanol loading) (See Marine Loading - Gas & Eth Calculations.)
2,514,075 at VCUM2 (crude loading) (See Marine Loading - Crude Oil Calculations.)
948,508 at VCURR (gasoline loading) (See Rail Loading - Gas & Eth Calculations.)

Conversion from Petroleum Vapor Combusted in lbs to MMSCF (as Natural Gas Equivalent):

MMSCF (as Natural Gas) = Petroleum Vapor Combusted (lbs) * (21,000 BTUs / lb gasoline (high avg. for C4-C8 gases)(/ (1000 BTU/SCF) / (1,000,000)

MMSCF (as Natural Gas) combusted at VCUML = 37
MMSCF (as Natural Gas) combusted at VCUM2 = 53
MMSCF (as Natural Gas) combusted at VCURR = 20

Marine VCU Emissions from Gasoline & Ethanol Loading (Emission Unit VCUML):

	Combustion Emissions									
Pollutant	PM	PM10	SOx	NOx	VOC*	CO	CO2	N2O	CH4	GHG
Emission Factor - lbs / MM SCF**	7.60	7.60	197.47	150.00	NA	84.00	120,000.00	2.2	2.3	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	280.10	280.10	7,277.83	5,528.25	NA	3,095.82	4,422,600.00	81.08	84.77	4,451,125.77
tons/yr	0.14	0.14	3.64	2.76	NA	1.55	2,211.30	0.04	0.04	2,225.56

Marine VCU Emissions from Crude Oil Loading (Emission Unit VCUM2):

	Combustion Emissions									
Pollutant	PM	PM10	SOx	NOx	VOC*	CO	CO2	N2O	CH4	GHG
Emission Factor - lbs / MM SCF**	7.60	7.60	197.47	150.00	NA	84.00	120,000.00	2.2	2.3	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	401.25	401.25	10,425.65	7,919.34	NA	4,434.83	6,335,468.88	116.15	121.43	6,376,332.65
tons/yr	0.20	0.20	5.21	3.96	NA	2.22	3,167.73	0.06	0.06	3,188.17

Rail VCU Emissions from Gasoline & Ethanol Loading (Emission Unit VCURR):

	Combustion Emissions									
Pollutant	PM	PM10	SOx	NOx	VOC*	CO	CO2	N2O	CH4	GHG
Emission Factor - lbs / MM SCF**	7.60	7.60	197.47	150.00	NA	84.00	120,000.00	2.2	2.3	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	151.38	151.38	3,933.38	2,987.80	NA	1,673.17	2,390,241.24	43.82	45.81	2,405,658.29
tons/yr	0.08	0.08	1.97	1.49	NA	0.84	1,195.12	0.02	0.02	1,202.83

* These emissions are from gasoline and crude oil vapor combustion and pilot light gas. Gasoline and crude oil VOCs are already accounted for in the VCU emissions (i.e. 2 mg/l loaded or 98% efficiency).

** PM Emission Factor is from AP-42 (Table 1.4-2), as it is higher than the Emission Factor from the VCU manufacturer of zero (0). SOx Emission Factor is calculated as described below. NOx Emission Factor is from VCU manufacturer, as it is higher than the AP-42 Emission factor of 140 lbs/MMSCF (Table 1.4-1). CO Emission Factors is identical from VCU manufacturer and AP-42 (Table 1.4-1). GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (25), and N2O (298)

Example calculation of SOx Emission Factor:

SOx Emission Factor = $y_{H2S} * (1/C) * M_{SO2} * MW_{SO2}$ (Equation from EPA Emission Inventory Improvement Program (EIIP) Document Volume 3, Ch.10: Preferred & Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production & Procesing Operations, Sept. 1999, Pg 10.2-16.)

$y_{H2S,\ crude\ oil}$ = 0.001 (mole fraction of H2S in inlet gas (lb mole H2S/ lb mole) based on 10 ppm H2S liquid concentration)
C = 379.00 (molar volume of ideal gas at 60F and 1atm (scf/lb-mole))
M = 0.99 (molar conversion ratio from H2S to SO2 (lb-mole SO2/lb-mole H2S) (From VCU Manufacturer))
MW = 64.066 (molecular weight of SO2 (lb SO2/lb-mole SO2))

$EF_{SOX,crude\ oil}$ = 197.47 lb/ MMSCF

Total of Combustion Sources

Pollutant	PM	SOx	NOx	VOC	CO	CO2	N2O	CH4	GHG
lb/yr	2,326.78	21,754.85	36,090.23	1,080.49	25,706.92	36,733,114.17	693.00	684.29	36,973,545.05
tons/yr	1.16	10.88	18.05	0.54	12.85	18,366.56	0.35	0.34	18,486.77

<u>Emergency Generators (Exempt)</u> Updated with Part 496 emission factors

Emergency Generator Sources:

Fuel Type	Source	Gal/hr (Liquid)	SCF/hr (Gas)	Gal/hr (Gas)	MMBTU/hr*
Propane	QT100 Generator	13.9			1.26
Propane	QT100 Generator	13.9			1.26
Natural Gas	20kw NG Generator		1,020		1.02
Diesel	500kw	26.1			
Diesel	350kw	18.5			
Diesel	350kw	18.5			

*Generac Spec Sheet states, "For BTU content multiply gal/hr x 90950 (LP) or ft3/hr x 1000 (NG)."

Distillate Fired Engine Emissions:

	Pollutant									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Factor - lb/1000 gal*	2.00	2.00	0.21	20.00	0.20	5.00	0.22	0.26	2.2E+04	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	63.10	63.10	6.72	631.00	6.31	157.75	6.81	8.20	703,565.00	706,303.04
tons/yr	0.03	0.03	0.00	0.32	0.00	0.08	0.00	0.00	351.78	353.15

* Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I. SOx, Nox, CO, and PM Emission Factors are from Table 1.3-1. VOC Emission Factor is from Table 1.3-3. CO2 Emission Factor is from Table 1.3-12.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation:
= gal/yr / 1000 gal * emission factor

Natural Gas & Propane Fired Engine Emissions:

	lbs Pollutant / MM BTU									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Factor* - lb/MMBtu	0.0099	0.0099	0.0006	2.270	0.0296	3.720	0.230	0.2	110.0	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	17.58	17.58	1.04	4,027.45	52.52	6,600.04	408.07	408.07	195,162.55	337,169.92
tons/yr	0.01	0.01	0.00	2.01	0.03	3.30	0.20	0.20	97.58	168.58

* Emission factors used to estimate emissions are from AP-42 Table 3.2-3. No emission factor was available for N2O so the CH4 emission factor was used.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example Calculation of Natural Gas Usage

= Natural Gas Used 1,774 MMBTU/yr Assumes 500 hours/yr
= Natural Gas Used * Emission factor

<u>Total of Generator Sources</u>

Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG
lb/yr	80.68	80.68	7.76	4,658.45	58.83	6,757.79	414.88	416.27	898,727.55	1,043,472.95
tons/yr	0.04	0.04	0.00	2.33	0.03	3.38	0.21	0.21	449.36	521.74

Upstream GHG Calculations - Current Sources

Emergency Generator Sources:

Fuel Type	Source	Gal/hr (Liquid)	SCF/hr (Gas)	MMBTU/hr*	MMBTU/yr**
Propane	QT100 Generator	13.9		1.67	834
Propane	QT100 Generator	13.9		1.67	834
Natural Gas	20kw NG Generator		1,020	1.05	527
Diesel	500kw	26.1		3.58	1,788
Diesel	350kw	18.5		2.53	1,267
Diesel	350kw	18.5		2.53	1,267

*High Heating Value from Table A4 from Emission Factors for Use by State Agencies and Applicants of 2022 NYS Statewide GHG Emissions Report

**Assumes 500 hours of operation

Existing Exempt Combustion Sources:

Fuel Type	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
Distillate	Furnace	590			81
Natural Gas	Boiler (water bldg)	–			54
Natural Gas	Boiler (garage)	–			22
Natural Gas	Boiler (office)	–			163
Natural Gas	Furnace	–			120

Existing Non-Exempt Combustion Sources:

Fuel Type	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
Natural Gas	VCUs (VCUML/VCUM2/VCURR)*	–			200,000

*Includes natural gas used as assist gas for both marine VCUs (VCUML and VCUM2) and the rail VCU (VCURR)

Propane

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.26	0.0006	36.56	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	437.600	0.956	60,977.163	97,987.97
tons/yr	0.219	0.0005	30.489	48.994

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Natural Gas

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.77	0.0003	26.91	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	155,007.499	62.003	5,405,775.820	18,442,774.56
tons/yr	77.504	0.0310	2,702.888	9,221.387

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Distillate

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.26	0.0006	32.19	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1,155.175	2.427	141,717.606	239,392.96
tons/yr	0.578	0.0012	70.859	119.696

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Total

Pollutant	CH4	N2O	CO2	GHG
lb/yr	156,600.274	65.386	5,608,470.590	18,780,155.49
tons/yr	78.300	0.0327	2,804.235	9,390.078

Attachment 2

Post-Project GHG Emissions Calculations

Fuel Combustion Emissions

Existing Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Distillate	Furnace	590			–
NA	Natural Gas	Boiler (water bldg	–			54
NA	Natural Gas	Boiler (garage)	–			22
NA	Natural Gas	Boiler (office)	–			163
NA	Natural Gas	Furnace	–			120

Proposed Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Natural Gas	Heater (line trace	–			35,040
NA	Natural Gas	Boiler (line trace)	–			35,040
NA	Natural Gas	Boiler (tanks)	–			52,560
NA	Natural Gas	Boiler (lube bldg)	–			86,724
NA	Natural Gas	Boiler (lube bldg)	–			86,724
NA	Natural Gas	Boiler (lube bldg)	–			86,724
NA	Natural Gas	Boiler (lube bldg)	–			86,724

Existing Non-Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
VCUML/VCUM2/VCURR*	Natural Gas	VCU	–			150,000

*Includes natural gas used as assist gas for both marine VCUs (VCUML and VCUM2) and the rail VCU (VCURR)

Distillate Combustion Emissions:

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Emission Factor - lb/1000 gal*	2.00	2.00	0.21	20.00	0.20	5.00	0.22	0.26	2.2E+04	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1.18	1.18	0.13	11.80	0.12	2.95	0.13	0.15	13157.00	13,208.20
tons/yr	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	6.58	6.60

* Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I. SOx, Nox, CO, and PM
Emission Factors are from Table 1.3-1. VOC and CH4 Emission Factors are from Table 1.3-3. CO2 Emission Factor is from Table 1.3-12. N2O Emission Factor is from Table 1.3-8.
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation (using SOx):
= gal/yr / 1000 gal * Emission Factor
= 590 gal/yr / 1000 gal * 52.54 lb/1000 gal (SOx)
= 31.00 lb/yr

Natural Gas Combustion Emissions (from existing sources)*:

	Combustion Emissions									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG***
Emission Factor - lb / MM BTU	0.0075	0.0075	0.00059	0.098	0.0054	0.082	0.002	0.002	117.647	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1,120.32	1,120.32	88.45	14,741.08	810.76	12,382.51	339.04	324.30	17,689,294.12	17,803,390.06
tons/yr	0.56	0.56	0.04	7.37	0.41	6.19	0.17	0.16	8,844.65	8,901.70

*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 are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Tables 1.4-1, 1.4-2, and 1.4-3, except for GHG.
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Total Natural Gas Used 150,359 MMBTU/yr

Example Calculation (using SOx):
= Total Natural Gas Used * Emission Factor
= Total Natural Gas Used (150,359) MMBTU/yr * 0.00059 lb / MM BTU
= 117.86 lb/yr

Natural Gas Combustion Emissions (from proposed sources)*:

	Combustion Emissions									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG***
Emission Factor - lb / MM BTU	0.0075	0.0075	0.00059	0.098	0.0054	0.082	0.002	0.002	117.647	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	3,498.50	3,498.50	276.20	46,032.94	2,531.81	38,667.67	1,058.76	1,012.72	55,239,529.41	55,595,824.38
tons/yr	1.75	1.75	0.14	23.02	1.27	19.33	0.53	0.51	27,619.76	27,797.91

*Total emissions from natural gas combustion from proposed sources include emissions from the combustion of natural gas in proposed boilers.

** Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Tables 1.4-1, 1.4-2, and 1.4-3, except for GHG.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Total Natural Gas Used 469536.00 MMBTU/yr

Example Calculation (using SOx):
= Total Natural Gas Used * Emission Factor
= Total Natural Gas Used (469,536) MMBTU/yr * 0.00059 lb / MM BTU
= 276.2 lb/yr

VCU Vapor Combustion Emissions

(Emissions from Combustion of Petroleum Product Loaded)

Petroleum Vapor Combusted (lbs):

6,215,882 Total
3,510,000 at VCUML (gasoline and ethanol loading) (See Marine Loading - Refined Product Calculations.)
808,865 at VCUM2 (crude loading) (See Marine Loading - Crude Oil Calculations.)
1,897,017 at VCURR (gasoline loading) (See Rail Loading - Refined Product Calculations.)

Conversion from Petroleum Vapor Combusted in lbs to MMSCF (as Natural Gas Equivalent):

MMSCF (as Natural Gas) = Petroleum Vapor Combusted (lbs) * (21,000 BTUs / lb gasoline (high avg. for C4-C8 gases)(/ (1000 BTU/SCF) / (1,000,000)
MMSCF (as Natural Gas) combusted at VCUML 74
MMSCF (as Natural Gas) combusted at VCUM2 17
MMSCF (as Natural Gas) combusted at VCURR 40

Marine VCU Emissions from Gasoline & Ethanol Loading (Emission Unit VCUML):

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC*	CH4	N2O	CO	CO2	GHG
Emission Factor - lbs / MM SC	7.60	7.60	197.47	150.00	NA	2.30	2.20	84.00	120,000.00	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	560.20	560.20	14,555.66	11,056.50	NA	169.53	162.16	6,191.64	8,845,200.00	8,902,251.54
tons/yr	0.28	0.28	7.28	5.53	NA	0.08	0.08	3.10	4,422.60	4,451.13

Marine VCU Emissions from Crude Oil Loading (Emission Unit VCUM2):

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC*	CH4	N2O	CO	CO2	GHG
Emission Factor - lbs / MM SC	7.60	7.60	197.47	150.00	NA	2.30	2.20	84.00	120,000.00	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	129.09	129.09	3,354.29	2,547.92	NA	39.07	37.37	1,426.84	2,038,339.24	2,051,486.53
tons/yr	0.06	0.06	1.68	1.27	NA	0.02	0.02	0.71	1,019.17	1,025.74

Rail VCU Emissions from Gasoline & Ethanol Loading (Emission Unit VCURR):

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC*	CH4	N2O	CO	CO2	GHG
Emission Factor - lbs / MM SC	7.60	7.60	197.47	150.00	NA	2.30	2.20	84.00	120,000.00	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	302.76	302.76	7,866.76	5,975.60	NA	91.63	87.64	3,346.34	4,780,482.47	4,811,316.58
tons/yr	0.15	0.15	3.93	2.99	NA	0.05	0.04	1.67	2,390.24	2,405.66

* These emissions are from gasoline and crude oil vapor combustion and pilot light gas. Gasoline and crude oil VOCs are already accounted for in the VCU emissions (i.e. 2 mg/l loaded or 98% efficiency).

** PM Emission Factor is from AP-42 (Table 1.4-2), as it is higher than the Emission Factor from the VCU manufacturer of zero (0). SOx Emission Factor is calculated as described below. NOx Emission Factor is from VCU manufacturer, as it is higher than the AP-42 Emission factor of 140 lbs/MMSCF (Table 1.4-1). CO Emission Factors is identical from VCU manufacturer and AP-42 (Table 1.4-1). CO2 Emission Factor is from AP-42 (Table 1.402).

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation of SOx Emission Factor:

SOx Emission Factor = y_{H2S} * (1/C) * M_{SO2} * MW_{SO2} (Equation from EPA Emission Inventory Improvement Program (EIIP) Document Volume 3, Ch.10: Preferred & Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production & Procesing Operations, Sept. 1999, Pg 10.2-16.)

$y_{H2S,\ crude\ oil}$ = 0.001 (mole fraction of H2S in inlet gas (lb mole H2S/ lb mole) based on 10 ppm H2S liquid concentration)
C = 379.00 (molar volume of ideal gas at 60F and 1atm (scf/lb-mole))
M = 0.99 (molar conversion ratio from H2S to SO2 (lb-mole SO2/lb-mole H2S) (From VCU Manufacturer))
MW = 64.066 (molecular weight of SO2 (lb SO2/lb-mole SO2))

$EF_{SOX,crude\ oil}$ = 197.47 lb/ MMSCF

Total of Combustion Sources

Pollutant	PM 2.5	PM10	SOx	NOx	VOC	CH4	N2O	CO	CO2	GHG
lb/yr	5,612.06	5,612.06	26,141.49	80,365.85	3,342.69	1,698.16	1,624.36	62,017.94	88,606,002.24	89,177,477.30
tons/yr	2.81	2.81	13.07	40.18	1.67	0.85	0.81	31.01	44,303.00	44,588.74

Emergency Generators (Exempt) Updated with Part 496 emission factors

Emergency Generator Sources:

Fuel Type	Source	Gal/hr (Liquid)	SCF/hr (Gas)	Gal/hr (Gas)	MMBTU/hr*
Propane	QT100 Generator	13.9			1.26
Propane	QT100 Generator	13.9			1.26
Natural Gas	20kw NG Generator		1,020		1.02
Diesel	500kw	26.1			
Diesel	350kw	18.5			
Diesel	350kw	18.5			

*Generac Spec Sheet states, "For BTU content multiply gal/hr x 90950 (LP) or ft3/hr x 1000 (NG)."

Distillate Fired Engine Emissions:

	Pollutant									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Factor - lb/1000 gal*	2.00	2.00	0.21	20.00	0.20	5.00	0.22	0.26	2.2E+04	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	63.10	63.10	6.72	631.00	6.31	157.75	6.81	8.20	703,565.00	706,303.04
tons/yr	0.03	0.03	0.00	0.32	0.00	0.08	0.00	0.00	351.78	353.15

* Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I. SOx, Nox, CO, and PM Emission Factors are from Table 1.3-1. VOC Emission Factor is from Table 1.3-3. CO2 Emission Factor is from Table 1.3-12.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation:
= gal/yr / 1000 gal * emission factor

Natural Gas & Propane Fired Engine Emissions:

	lbs Pollutant / MM BTU									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Factor* - lb/MMBtu	0.0099	0.0099	0.0006	2.270	0.0296	3.720	0.230	0.2	110.0	CH4*84)+(N2O*264)+(CO2*1)
lb/yr	17.58	17.58	1.04	4,027.45	52.52	6,600.04	408.07	408.07	195,162.55	337,169.92
tons/yr	0.01	0.01	0.00	2.01	0.03	3.30	0.20	0.20	97.58	168.58

* Emission factors used to estimate emissions are from AP-42 Table 3.2-3. No emission factor was available for N2O so the CH4 emission factor was used.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example Calculation of Natural Gas Usage

= Natural Gas Used 1,774 MMBTU/yr Assumes 500 hours/yr
= Natural Gas Used * Emission factor

Total of Generator Sources

Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG
lb/yr	80.68	80.68	7.76	4,658.45	58.83	6,757.79	414.88	416.27	898,727.55	1,043,472.95
tons/yr	0.04	0.04	0.00	2.33	0.03	3.38	0.21	0.21	449.36	521.74

Proposed Sources - Upstream GHG Emission Calculations

Emergency Generator Sources:

Fuel Type	Source	Gal/hr (Liquid)	SCF/hr (Gas)	MMBTU/hr*	MMBTU/yr**
Propane	QT100 Generator	13.9		1.67	834
Propane	QT100 Generator	13.9		1.67	834
Natural Gas	20kw NG Generator		1,020	1.05	527
Diesel	500kw	26.1		3.58	1,788
Diesel	350kw	18.5		2.53	1,267
Diesel	350kw	18.5		2.53	1,267

*High Heating Value from Table A4 from Emission Factors for Use by State Agencies and Applicants of 2022 NYS Statewide GHG Emissions Report

**Assumes 500 hours of operation per year

Proposed Exempt Combustion Sources:

Fuel Type	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
Natural Gas	Heater (line trace)	–			35,040
Natural Gas	Boiler (line trace)	–			35,040
Natural Gas	Boiler (tanks)	–			52,560
Natural Gas	Boiler (lube bldg)	–			86,724
Natural Gas	Boiler (lube bldg)	–			86,724
Natural Gas	Boiler (lube bldg)	–			86,724
Natural Gas	Boiler (lube bldg)	–			86,724

Existing Exempt Combustion Sources:

Fuel Type	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
Distillate	Furnace	590			81
Natural Gas	Boiler (water bldg)	–			54
Natural Gas	Boiler (garage)	–			22
Natural Gas	Boiler (office)	–			163
Natural Gas	Furnace	–			120

Existing Non-Exempt Combustion Sources:

Fuel Type	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
Natural Gas	VCUs (VCUML/VCUM2/VCURR)*	–			150,000

*Includes natural gas used as assist gas for both marine VCUs (VCUML and VCUM2) and the rail VCU (VCURR)

Propane

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.26	0.0006	36.56	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	437.600	0.956	60,977.163	97,987.97
tons/yr	0.219	0.0005	30.489	48.994

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Natural Gas Existing Sources

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.77	0.0003	26.91	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	116,426.603	46.5706	4,060,294.6342	13,852,423.98
tons/yr	58.213	0.0233	2,030.147	6,926.212

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Natural Gas Proposed Sources

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.77	0.0003	26.91	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	362,302.391	144.9210	12,635,037.0841	43,106,697.03
tons/yr	181.151	0.0725	6,317.519	21,553.349

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Distillate

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.26	0.0006	32.19	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1,155.175	2.427	141,717.606	239,392.96
tons/yr	0.578	0.0012	70.859	119.696

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Total

Pollutant	CH4	N2O	CO2	GHG
lb/yr	480,321.769	194.875	16,898,026.488	57,296,501.93
tons/yr	240.161	0.0974	8,449.013	28,648.251

Attachment 3

Projected Actual GHG Emissions Calculations

Fuel Combustion Emissions - Projected Actual Proposed Sources

Proposed Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Natural Gas	Heater (line trace)	–			8,760
NA	Natural Gas	Boiler (line trace)	–			8,760
NA	Natural Gas	Boiler (tanks)	–			13,140
NA	Natural Gas	Boiler (lube bldg)	–			21,681
NA	Natural Gas	Boiler (lube bldg)	–			21,681
NA	Natural Gas	Boiler (lube bldg)	–			21,681
NA	Natural Gas	Boiler (lube bldg)	–			21,681

Natural Gas Combustion Emissions (from proposed sources)*:

	Combustion Emissions									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG***
Emission Factor - lb / MM BTU	0.0075	0.0075	0.00059	0.098	0.0054	0.082	0.002	0.002	117.647	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	874.63	874.63	69.05	11,508.24	632.95	9,666.92	264.69	253.18	13,809,882.35	13,898,956.09
tons/yr	0.44	0.44	0.03	5.75	0.32	4.83	0.13	0.13	6,904.94	6,949.48

*Total emissions from natural gas combustion from proposed sources include emissions from the combustion of natural gas in proposed boilers.

** Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Tables 1.4-1, 1.4-2, and 1.4-3, except for GHG.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Upstream GHG Calculations - Proposed Sources - Projected Actual Emissions

Proposed Exempt Combustion Sources:

Product	Source	MMBTU/hr	MMBTU/yr*
Natural Gas	Heater (line trace)	4	8,760
Natural Gas	Boiler (line trace)	4	8,760
Natural Gas	Boiler (tanks)	6	13,140
Natural Gas	Boiler (lube bldg)	9.9	21,681
Natural Gas	Boiler (lube bldg)	9.9	21,681
Natural Gas	Boiler (lube bldg)	9.9	21,681
Natural Gas	Boiler (lube bldg)	9.9	21,681

*Assumes heaters/boilers are only used 25% of the year (2,190 hours)

Natural Gas

Pollutant	CH4	N2O	CO2	GHG
Emission Factor (lb/MMBTU)**	0.77	0.0003	26.91	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	90,575.598	36.230	3,158,759.271	10,776,674.26
tons/yr	45.288	0.0181	1,579.380	5,388.337

** Source is Table A1 in Appendix A. Emission Factors for Use by State Agencies and Applicants, converted from g/MMBTU to lb/MMBTU.

Appendix A

Previous CLCPA submissions

Global Companies LLC., 800 South Street, P.O. Box 9161, Waltham, MA 02454-9161 ph: 781-894-8800

March 2, 2021

VIA E-MAIL
Angelika.Stewart@dec.ny.gov

Angelika Stewart
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 4
1130 North Westcott Road
Schenectady, NY 12306-2014

RE: Supplemental Response to Request for Additional Information Related to the 2019 Climate Leadership and Community Protection Act
Global Companies, Albany Terminal
Air Title V Permit Application
DEC #4-0101-00112/00029
City of Albany, Albany County

Dear Ms. Stewart:

Global Companies LLC (Global or Applicant) is submitting this letter to supplement its previous submissions made in response to a pair of DEC requests for additional information (RFAIs) dated May 19, 2020 and September 11, 2020 seeking information concerning Global's application to renew and modify its existing Title V air permit for the Albany Terminal. Copies of those original submissions, excluding attachments, are included as Attachments A and B, respectively. Among other things, the RFAIs asked Global to assess the consistency of its proposed project with the goals of the 2019 Climate Leadership and Community Protection Act (CLCPA), Following submission of its December 3, 2020 response to the second RFAI, DEC asked Global to quantify the greenhouse gas (GHG) emissions associated with the extraction and transmission of project-related fuels imported into the state and combusted at the Albany Terminal. This submission responds to that request.

As set forth in greater detail in its previous submissions, Global has proposed various changes at its Albany Terminal, including, but not limited to: reducing its allowable crude oil throughput by 1,400 million (1.4 billion) gallons and overall allowable throughput by 950 million gallons; installing a vacuum assist ("vac assist") system to reduce fugitive volatile organic compound (VOC) emissions at the railcar loading rack; and installing exempt natural gas-fired boilers/heaters to enable the Terminal to manage biodiesel (collectively, the "Project").

As discussed in its December 3, 2020 RFAI response, although the boilers will increase direct GHG emissions at the Terminal, the Project will result in a significant reduction in overall GHG emissions based on the lifecycle GHG emission reductions associated with the substitution of biomass-based diesel for petroleum diesel. This conclusion does not change with the addition of the GHG emissions associated with extraction and transmission of the natural gas proposed to be burned in the new boilers/heaters because lifecycle GHG emissions associated with renewable fuels generally and biomass-based diesel, in particular, are significantly lower than those associated with the petroleum-based diesel. As a result, the GHG emissions associated with the extraction and transmission of the natural gas proposed to be combusted in the new boilers/heaters are more than offset by the climate change benefits associated with switching to biodiesel.

The CLCPA requires significant reductions in stationary and mobile source GHG emissions by 2050. Global has proposed a modification to its Title V permit that would allow for the installation of small boilers/heaters needed to manage biodiesel at the Terminal. This supplemental response shows why the transition from petroleum-based to biomass-based diesel fuels will achieve significant reductions in lifecycle GHG emissions at the Terminal that will further the objectives of the CLCPA even if upstream emissions from the extraction and transmission of the natural gas proposed to be combusted in the new boilers/heaters is considered.

The GHG lifecycle emission data presented below demonstrates that on a per gallon basis, each gallon of biodiesel loaded emits approximately 6 lbs of lifecycle carbon dioxide equivalent (CO_2e) emissions less than comparable petroleum-based diesel. The analysis shows that Global needs to only replace 19 million gallons of petroleum-based diesel throughput per year with biodiesel to offset the maximum added boiler/heater GHG emissions and achieve emission reductions of CO_2e equivalent to a 40% reduction from pre-Project baseline emissions at the Terminal. If 50 million gallons of biodiesel throughput replaced petroleum-based diesel, the GHG lifecycle emissions would be reduced by 149,380 tons per year (tpy) of CO_2e. The more biodiesel the Terminal handles, the greater the benefits of the Project from a climate change perspective. The Project is thus consistent with the CLCPA goal of reducing GHG emissions 40% from 1990 levels by 2030.

Installing the proposed boilers/heaters would generate an immediate climate change benefit by facilitating the shift to a more climate-friendly fuel as the State transitions to a reduced carbon future under the CLCPA. DEC, in approving the proposed boilers/heaters, will further the goals of the CLCPA and allow the expanded use of biodiesel as a transitional substitute fuel for petroleum-based diesel.

Quantification of GHGs Associated with Fuel Extraction and Transmission

The CLCPA regulates various pollutants as GHGs. *See* 6 NYCRR § 496.5.[1] Each GHG has been assigned a CO_2e that represents "[t]he amount of carbon dioxide by mass that would produce the same global warming impact as the given mass of another greenhouse gas over a specific timeframe. . . ." 6 NYCRR § 496.3(b). As part of its December 3, 2020 submission, Global

---

[1] The CLCPA identifies six categories of pollutants as GHGs. DEC recently finalized regulations establishing statewide GHG emission limits under the CLCPA. In the final rule, DEC included a list of substances identified as GHGs, together with their carbon dioxide equivalent value. The only GHGs associated with the Project are carbon dioxide, methane and nitrous oxide.

quantified direct potential GHG emissions associated with the combustion of natural gas in the new boilers/heaters needed to handle biodiesel at the Albany Terminal. With the current submission, Global adjusted these combustion-related numbers to reflect the final CO_2e values found in DEC's recently adopted Part 496 regulations. For purposes of calculating the GHG emissions associated with the extraction and transmission of the fuel imported into the State and then combusted in those boilers, Global used the emission factors contained in DEC's February 2021 document entitled "Preliminary Interim Draft Emission Factors for Use by State Agencies and Project Proponents," which was supplied by DEC for this purpose. All emissions are measured in tons per year. Information about how these emissions were calculated can be found in Attachment C. A summary of the results is set forth below.

<u>Potential GHG emissions from new boilers/heaters associated with direct combustion of natural gas at the Facility</u>
CO_2: 27,619.76 tpy
Methane: 0.53 tpy (44.52 CO_2e)
Nitrous Oxide: 0.51 tpy (134.64 CO_2e)
Total CO_2e: 27,798 tpy (based on final Part 496 equivalency factors)

<u>Upstream GHG emissions from extraction/transmission of natural gas imported into state and combusted in boilers/heaters at the Facility</u>
CO_2: 6,165.77 tpy
Methane: 198.75 tpy (CO_2e 16,695 tpy)
Nitrous Oxide: 0.07 tpy (CO_2e 18.48 tpy)
Total CO_2e: 22,879 tpy

Combined CO_2e: 50,677 tpy

Note, however, that this number represents operation at maximum capacity for 8,760 hours per year. As set forth below, the Terminal's ability to manage biodiesel is constrained by transportation limits, offloading capacity, tank capacity, and other factors to a maximum of approximately 300 million gallons annually, meaning maximum GHG emissions associated with the planned biodiesel operation are far below the numbers presented above. Finally, Global anticipates running its biodiesel operations at most, approximately 25% of the time. As a result, actual GHG emissions associated with the Terminal's biodiesel operations are expected to be far below 50,677 tpy CO_2e.

Implications of Inclusion of GHG Emissions Associated with Extraction/Transmission on CLCPA Analysis with Respect to Boilers/Heaters

The inclusion of GHG emissions associated with the extraction/transmission of natural gas combusted at the Albany Terminal does not affect the conclusion in the December 3, 2020 submission that the Project is consistent with the goals of the CLCPA. The production and use of biofuel are encouraged by both federal and state programs, in large part because of its climate change benefits. As discussed in Global's earlier submission, analyses of fuels regulated under EPA's Renewable Fuel Standards (RFS) program show that biomass-based diesel and renewable fuels as defined under the RFS program emit significantly less GHGs than the petroleum-based diesel they replace when measured on a lifecycle basis. To qualify as "biomass-based diesel" under the RFS program, the producer/importer must show that the particular type of diesel fuel has lifecycle GHG emissions that are at least 50% lower than comparable petroleum diesel. To qualify generally as "renewable fuel," the fuel must have lifecycle GHG emissions that are at least 20% less than the baseline fuel it replaces. *See* 40 CFR § 80.1401 for the relevant definitions. The lifecycle analysis includes all GHG emissions associated with the production of each type of fuel, including those associated with fuel production and transmission. In other words, the GHG emissions DEC has asked Global to quantify as part of its CLCPA analysis are already part of the assessment performed by EPA under the RFS program. EPA thus has already accounted for these emissions in deciding whether fuels achieve the GHG reductions necessary to qualify as renewable under the RFS program.

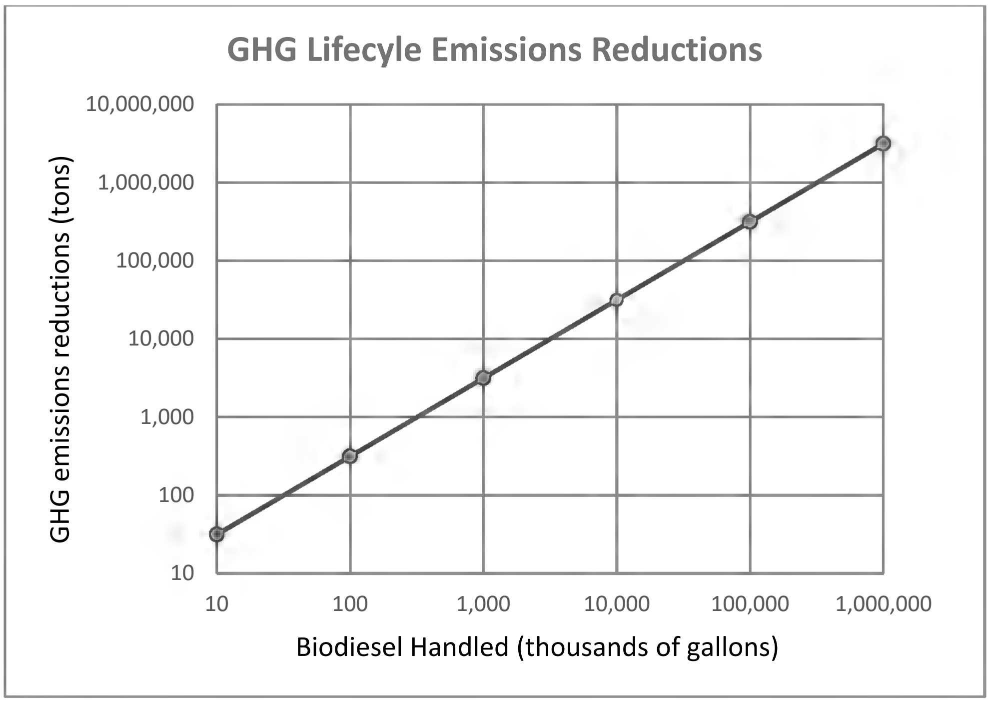
The December 3, 2020 submission showed that the more biodiesel the Terminal handles (relative to petroleum-based diesel) under the RFS program, the greater the overall climate change benefits.[2] A review of the lifecycle GHG emissions associated with petroleum versus biodiesel showed that the comparatively modest potential GHG emissions associated with operating the natural gas-fired boilers/heaters needed to manage the biodiesel will be more than offset by the GHG benefits of switching from petroleum to biomass-based diesel. This conclusion does not change with the addition of upstream GHG emissions associated with the extraction and transmission of the natural gas imported into the State and combusted at the Terminal.

In its December 3, 2020 submission, Global compared the GHG benefits associated with swapping biodiesel for petroleum diesel (i.e., distillate) with the additional GHG emissions associated with the combustion of the natural gas used to fuel the boilers/heaters needed to manage the biodiesel at the Terminal using the 20% threshold for renewable fuels, a conservative assumption. As this analysis showed, on a per gallon basis, each gallon of biodiesel loaded emits approximately 6 lbs of lifecycle CO_2e emissions less than petroleum distillate assuming the biodiesel is regulated only as renewable fuel (i.e., is subject to the 20% threshold under the RFS program). Without taking the upstream GHG emissions associated with "imports" into account, the analysis showed that Global would need to replace approximately 12,742,280 gallons of diesel with biodiesel to achieve emission reductions of CO_2e equivalent to a 40% reduction from pre-Project baseline emissions at the Terminal. If the upstream GHG emissions associated with the extraction and transmission of the imported natural gas are taken into account, the number increases to 19,059,116 gallons. This analysis shows that the total GHG emissions associated with operating the boilers/heaters at full capacity are more than outweighed by the GHG benefits of burning biodiesel rather than petroleum diesel.

---

[2] As noted in the December 3, 2020 submission, Global currently stores and distributes biodiesel blends within its terminal network which only contain biodiesel that qualifies as "biomass-based diesel" under the RFS program. This biodiesel emits a *minimum* of 50% less lifecycle GHGs than the petroleum diesel it replaces. In fact, certain biodiesel fuels that qualify as biomass-based diesel achieve lifecycle GHG emission reductions relative to petroleum diesel that exceed the 50% reduction threshold. To be conservative for purposes of its CLCPA analysis, however, Global assumed that the biodiesel it will manage using the boilers/heaters meets the less stringent 20% threshold for renewable fuels.

The graph below illustrates the relationship between GHG emissions from the boilers/heaters needed to manage biodiesel at the Terminal and the GHG benefits associated with biodiesel versus petroleum diesel. In the December 3, 2020 submission, a value was created by dividing the 27,784 tons of GHG emissions from the boilers/heaters by the maximum volume of biodiesel product that can be managed at the Terminal (about 300 million gallons). To address the emissions associated with extraction/transmission of the natural gas combusted in the boilers/heaters, a new value was created by dividing all emissions associated with the boilers (i.e., on-site combustion and upstream extraction/transmission) by 300 million gallons. These boiler/heater GHG emissions were then deducted from the lifecycle GHG emission reductions to obtain an estimate of the per gallon GHG benefits of biodiesel relative to petroleum diesel taking the new boiler/heater emissions estimate into account. Again, the results were plotted for different levels of biodiesel product.



Updated calculations are included as Attachment D. The information provided clearly shows that the Project will have a significant climate change benefit even when upstream emissions associated with extraction/transmission are included since it will enable the Terminal to manage fuel with much lower lifecycle CO_2e emissions. These benefits more than outweigh the additional direct and upstream emissions associated with the boilers/heaters needed to manage those fuels.

Also, the analysis above assumes that the Terminal will be operating at maximum capacity, taking into account actual operating constraints direct CO_2e emissions from this new equipment are estimated at 27,798 tpy CO_2e assuming the units are operating 8,760 hours per year. However, as reported in Global's July 7, 2020 response to DEC's first RFAI, the boilers/heaters are expected to operate no more than approximately 25% of the time (up to approximately 2,200 hours per year). In particular, the boilers/heaters are not expected to operate as often in the summer as in the colder months. Under this more realistic scenario, GHG emissions from the Terminal are expected to increase by approximately 6,950 tpy CO_2e as a result of natural gas combustion in the new boilers/heaters The upstream GHG emissions associated with the extraction and transmission of fuel under this scenario is only 5,720 tpy CO_2e, resulting in total anticipated GHG emissions annually of approximately 12,670 tpy CO_2e.

Implications of Inclusion of GHG Emissions Associated with Extraction/Transmission on CLCPA Analysis with Respect to Project Components Other than Boilers/Heaters

As discussed in the December 3, 2020 submission, the only major source of GHG emissions associated with the Project other than the new boilers/heaters are the vapor combustion units (VCUs) used to control VOC emissions from various loading operations. As previously noted, as part of the Project, Global is proposing to reduce total allowable product throughput at the Terminal by 950 million gallons. This change in allowable throughput—combined with the addition of a new vac assist unit at the rail loading rack that captures and combusts additional VOCs—is expected to result in a reduction in potential GHG emissions. The reduction in total allowable product throughput at the Terminal by 950 million gallons means the quantity of fossil fuel potentially available for capture and combustion in the VCUs will be reduced by 950 million gallons. No further analysis of GHG emissions associated with this aspect of the Project is therefore necessary.

Conclusion

The inclusion of the upstream GHG emissions associated with the extraction and transmission of fuel into New York for combustion at the Albany Terminal does not change the basic conclusion in the first and second RFAI responses that the Project is consistent with the goals of the CLCPA. The Project will reduce allowable crude oil throughput at the Terminal by 1,400 million (1.4 billion) gallons (75%) and overall allowable Terminal throughput by 950 million gallons (27%). These changes are consistent with the CLCPA goal of reducing reliance on fossil fuel. The portion of the Project targeted at facilitating the management of biodiesel will likewise help the State to reduce reliance on fossil fuels by encouraging a switch to biodiesel. Although operation of the boilers/heaters needed to manage biodiesel will result in increased direct emissions at the Terminal (associated with natural gas combustion in the boilers/heaters) and upstream emissions (associated with the extraction and transmission of the natural gas imported into the State), the climate benefits associated with managing biodiesel in light of the significant lifecycle benefits of biodiesel relative to petroleum diesel more than outweigh the environmental costs.

As discussed in previous submissions, both the federal and State governments have adopted laws specifically encouraging the use of biodiesel. Going forward, New York cannot readily fulfill these specific mandates or reach its broader climate change goals if it does not allow projects in the short term to facilitate the management of biofuels as the State transitions away from fossil fuels.

More generally, DEC is currently in the early stages of implementing the CLCPA. Because it does not know what shape final implementation of the law will take, it is respectfully suggested that DEC should be careful to not eliminate compliance options that may help the State reach its goals by adopting unduly strict interpretations of the law. Currently, it is unclear precisely what role biodiesel will play in the transition away from fossil fuels. As discussed in Global's December 3, 2020 response, numerous homes in New York currently heat with distillate. Although it is our understanding that the State is considering implementing measures that would force homeowners to transition away from boilers and toward electrical heat, this change, if implemented, is still years away. In the interim, we suggest that DEC should encourage development of in-state capacity to manage biodiesel as a more climate-friendly substitute for distillate.

Global hopes that this submission satisfies the Department's remaining concerns regarding the consistency of its throughput reduction/biomass-based diesel Project with the goals of the CLCPA. If additional questions or concerns remain, please feel free to call or email.

Many thanks for your attention to this matter. I look forward to hearing from you.

Very truly yours,

Tom Keefe
Vice President Environmental, Health & Safety

Attachments

ATTACHMENT A
Response to May 19, 2020 Request for Additional Information
July 7, 2020

Global Companies LLC., 800 South Street, P.O. Box 9161, Waltham, MA 02454-9161 ph: 781-894-8800

July 7, 2020

Nancy M. Baker
Regional Permit Administrator
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 4
1130 North Westcott Road
Schenectady, NY 12306-2014

RE: Response to Request for Additional Information (RFAI)
Global Companies, Albany Terminal
Air Title V Application
DEC #4-0101-00112/00029
City of Albany, Albany County

Dear Ms. Baker:

I am submitting this letter on behalf of Global Companies LLC (Global) in response to your May 19, 2020 letter requesting additional information in support of Global's application to renew and modify its existing Air Title V application for its Albany Terminal, submitted in March 2020. For your convenience, we have duplicated the text from your letter and provided our response to your request. Note that we have not included those items that do not require a response from Global.

General:

1. The text should be clarified to indicate how many boilers and heaters will be installed, and where. The Lube Oil Building and tracing lines for pumping throughout the system should be labeled, as should other relevant buildings and structures, the rail yard for staging of trains and loading areas.

   Response: Global is proposing to install additional heaters/boilers as follows:
   - One 4 mmBtu/hr and one 6 mmBtu/hr heater to be housed in an existing building located in the southwest corner of the site adjacent to Tank 32. These heaters will be used to provide heat to Tanks 30 and 33, which will be used to store biodiesel.
   - Four 9.9 mmBtu/hr boilers to be housed in the existing Lube Oil Building located adjacent to the rail loading rack. These boilers will be used to provide heat to the rail cars needed to facilitate the offloading of biodiesel.
   - One 4 mmBtu/hr heater to be housed in an existing building located in the central/eastern portion of the site in the vicinity of Tank A65. This heater will be used to heat trace the line to the dock.

   The Lube Oil Building, tracing lines for pumping throughout the system, the proposed heaters, the rail yard for staging of trains, loading areas, and other relevant buildings and structures have been added to Diagram #1, Port of Albany Terminal, a copy of which is included as Attachment RFAI-A. This figure replaces Attachment B, Site Plan, in the EAF Supplement.

2. Please label the rail loading zone on the plans.
   Response: See response to Item 1 above.

Environmental Justice

1. The Department's Office of Environmental Justice has reviewed the modified proposal for conducting Environmental Justice outreach during the COVID crisis which is dated May 1, 2020. Please include this modification in the Public Participation Plan. The next public participation meeting can be scheduled in accordance with the modified plan. Please copy the Department on mailings, and please also consider social media outlets in addition to the methods listed to get the word out about meetings (twitter, facebook, etc.).

   Response: Global has revised its Public Participation Plan (PPP) to incorporate its proposal to address public outreach during the COVID crisis as Appendix D to the PPP with appropriate references to the Appendix added to the body of the PPP. A copy of the revised PPP is included as Attachment RFAI-B. Consistent with its commitment in the PPP, Global will provide copies of all stakeholder mailings to the individuals at DEC included on the Project's stakeholder list. As Global continues its outreach efforts, it will work with its Community Liaison and others to identify additional avenues for informing the public about upcoming meetings.

Water Usage

The application shows an increase in water use of 300 gpd, which will not be from a municipal source. Where is the water coming from, and what is its intended use.

Response: The application was incorrect. The 300 gpd increase in water will come from the City of Albany. The water will be used as boiler feed.

Climate Change

Section 7(2) of the 2019 Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019 (CLCPA) requires all state agencies in considering permits and other decisions to consider whether such decisions are inconsistent with or will interfere with the achievement of the Statewide greenhouse gas (GHG) emission limits established in article 75 of the ECL. These GHG emission limits require a 40 percent reduction from 1990 levels by 2030, and an 85 percent reduction by 2050. ECL § 75-0107(1). Moreover, as set forth in the CLCPA, the Statewide GHG emissions include emissions of GHGs from sources within the State, as well as GHGs "produced outside of the State associated with either the generation of electricity imported into the State or the extraction and transmission of fossil fuels imported into the State." ECL § 75-0101(13). Therefore, please identify and explain whether the project will be consistent or inconsistent with the statutory Statewide GHG emission limits, including by taking into account GHG emissions from the facility itself, as well as both upstream and downstream indirect GHG emissions associated with the facility.

Response:

Introduction

In the RFAI, DEC is seeking feedback concerning the consistency of the Global Project with the goals of the CLCPA. As set forth in greater detail below, The Project calls for installing equipment needed to manage biodiesel, which is a crucial alternative for transitioning away from fossil fuels and is required by New York law to be blended into heating oil sold downstate. The biodiesel proposed to be managed at the Terminal has lifecycle GHG emissions that are 50% below the petroleum fuel it replaces and thus is preferable from a climate change perspective. Although the equipment required to manage the biodiesel will emit some GHGs, this impact is more than outweighed by the benefits associated with promoting the use of biodiesel to help achieve the GHG emission reduction goals of the CLCPA. The remaining components of the Project will result collectively in a significant reduction in potential GHG emissions from the Terminal primarily attributable to a significant reduction in allowable throughput.

Role of Global Terminal in Petroleum Market

As a preliminary matter, to understand the implications of the CLCPA for the Terminal, it is important to understand the role the Terminal plays in the fossil fuel supply chain. Typically, Global acquires and/or manages product delivered to the Terminal in one of two ways. First, Global purchases product and then sells it to customers who market it at retail. Under this scenario, Global effectively functions as a wholesaler, purchasing product in bulk and selling it in smaller quantities to companies such as home heating oil dealers or gasoline stations for sale to the public. In addition, Global is retained by other companies to handle their petroleum products. Under this scenario, the product is owned by a third party and Global is simply storing and distributing it in accordance with the customer's wishes.

The Global Terminal's role in the fossil fuel supply chain thus focuses on ensuring that fossil fuel products extracted and processed by third parties are properly stored and then distributed to wholesalers and retailers for eventual sale to the public. Global is not responsible either for producing fossil fuel products (e.g., extraction/refining) or for combusting the product it stores and distributes—both activities that result in direct emissions of quantities of GHGs. Global's role in the fossil fuel supply chain is like that of a large-scale liquid distribution warehouse. We are simply a break bulk storage company. Global acquires its own products or manages products owned by third parties, stores them at its "warehouse" (i.e., the Terminal), "breaks bulk," and then distributes the products in smaller parcels from the Terminal to wholesalers and retailers. As part of these activities, Global also engages in some on-site fuel blending.[1]

[1] In analyzing Global's climate change impacts for purposes of the CLCPA, it is important to distinguish the Terminal's role in fossil fuel storage and distribution from that of a pipeline in light of DEC's recent decision concerning the Transcontinental Gas Pipe Line Company's ("Transco") Northeast Supply Enhancement Project (hereinafter "Transco Project"). In its May 15, 2020 decision denying Transco's request for a water quality certification, DEC contended that the Transco Project was inconsistent with the State's efforts to transition away from fossil fuels, noting, among other things, it "could extend the amount of time that natural gas may be relied upon to produce energy, which could, in turn delay, frustrate or increase the cost of the necessary transition away from natural gas and other fossil fuels." Although both the Global and Transco projects involve fossil fuel distribution, that is where the similarity ends. The Transco Project calls for the investment of many millions of dollars on the construction of

Biodiesel Handling and Storage

As part of the Project, Global is proposing to install boilers/heaters to enable it to manage biodiesel. This portion of the Project is entirely consistent with and directly helps support federal and state climate change policy—including the GHG emission reduction mandate of the CLCPA—by facilitating the switch to biodiesel. As set forth in greater detail below, biodiesel has been identified as an important "transitional" fuel for climate change purposes. At the federal level, EPA's renewable fuel standard was enacted with the goal of increasing development of climate-friendly alternative fuels, including biodiesel, that have lifecycle GHG emissions that are significantly less than those associated with the petroleum fuels they replace. At the state and local level, New York has specifically mandated the addition of biodiesel to home heating oil in the downstate area in recognition of its climate change benefits. The Project thus is consistent with the goal of the CLCPA since it facilitates the transition away from fossil fuels.

Biodiesel Project Description

Biodiesel is a renewable, biodegradable fuel manufactured from vegetable oils, animal fats, or recycled restaurant grease. Like petroleum diesel, biodiesel is used to fuel compression-ignition engines. Although biodiesel can be combusted in its pure form, it is typically blended with petroleum diesel and used in a blended form.

Because most biodiesel in its pure form is comparatively viscous, it may solidify or become non-pumpable at the lower temperatures that are typically observed in the Northeast, requiring heating to return it to a pumpable state for loading and storage. To generate the necessary heat to manage biodiesel, Global is proposing as part of the Project to install natural gas-fired steam boilers and oil heaters to heat tanks, railcars and associated product lines. Global is also proposing to install heating coils in Tank 30 and authorize storage of heated biodiesel with a maximum storage temperature of 120^{o} Fahrenheit in Tanks 30 and 33. The Project will enable Global to transfer biodiesel at the loading racks or create biodiesel blends within other distillate storage tanks at the facility. The tank cars arriving at the Terminal carrying biodiesel will be equipped with a jacket of noncontact piping located either on the outside of the railcar and/or coils within the cars. The railcar's noncontact piping will be attached to a hose upon arrival at the Terminal where steam will flow around the railcar through the jacket of piping similar to an old fashion home radiator. The heating will return the biodiesel to a pumpable state, enabling it to be pumped to Tanks 30 and 33, which will be similarly heated by circulating hot

---

entirely new, major fossil fuel distribution infrastructure. This type of major investment necessarily contemplates several decades of expanded fossil fuel use. Second, the Transco pipeline contemplates the expansion of markets for fossil fuel products at a time when the State is attempting to discourage their use. By comparison, the Global Project does not involve significant new investment in fossil fuel distribution infrastructure or an expansion in fuel markets. In fact, Global is proposing to *reduce* the allowable throughput at its Terminal by 27%. Also, the Project proposed by Global will enable the Terminal to manage biodiesel, an important option for transitioning away from fossil fuels. The Global Project thus will not "delay, frustrate or increase the cost of the necessary transition away from natural gas and other fossil fuels." To the contrary, the Project will reduce the amount of product the Terminal can manage while at the same enabling Global to better manage its operations as New York transitions away from fossil fuels in accordance with the mandate of the CLCPA.

oil through heating coils within the tanks. The boilers and heaters will *not* be used to heat crude oil or other products managed at the Terminal.

Federal Programs to Encourage Use of Biodiesel

As noted above, both the federal government and New York State have adopted laws and regulations designed to encourage the use of biodiesel in place of petroleum-based diesel in recognition of biodiesel's significant climate change benefits. At the federal level, Congress enacted the Renewable Fuel Standards (RFS) program with the goal of increasing the amount of fuel derived from plants and other similar materials—such as biodiesel—as a substitute for fossil fuels. *See* Clean Air Act § 211(o), 42 U.S.C.A. § 7545(o). In defining biodiesel for purposes of the RFS program, the law requires that the fuel achieve a 50% reduction in lifecycle GHG emissions when compared to the petroleum diesel it is intended to replace. Accordingly, authorizing Global to install the equipment needed to manage biodiesel is consistent with the CLCPA goal of reducing GHG emissions.

Under the RFS program, as amended, transportation fuel[2] must contain an increasing percentage of renewable fuel, advanced biofuel, biomass-based diesel, and cellulosic biofuel, with the standard for each fuel based on the lifecycle GHG reductions achieved by the fuel relative to comparable traditional fuels. With respect to renewable fuels generally, the law requires transportation fuels to contain at least 9.0 billion gallons of renewable fuels in 2008, rising to 36 billion gallons by 2022. Each year, EPA reviews the quantities of the four types of renewable fuels generated to determine whether the production goals are being met and to make adjustments consistent with the RFS statute and regulations as necessary. Fuels that meet the definition of a particular fuel count toward determining whether the obligated parties are achieving their renewable fuel volume requirements.

To implement the program, EPA has established a credit program under which renewable fuel producers must register with EPA and provide detailed information about the renewable fuel(s) produced to the agency. Once that information has been approved by EPA, the producer can generate Renewable Identification Numbers (RINs)—unique numbers assigned to every gallon or renewable fuel produced or imported into the United States. These RINs can then be transferred along with the renewable fuel batches they represent to refiners or importers or separated from the renewable fuel they represent and then sold.

As previously noted, in deciding whether a particular fuel qualifies as renewable fuel, advanced biofuel, biomass-based diesel, or cellulosic biofuel, EPA must conduct an analysis of the lifecycle GHG emissions associated with the fuel to determine whether it meets the threshold in the statute for the fuel type. Under the statute, the term "lifecycle greenhouse gas emissions" is defined as "the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel

[2] The term "transportation fuel" is defined in the statute as "fuel for use in motor vehicles, motor vehicle engines, nonroad vehicles, or nonroad engines (except ocean-going vessels)." 42 U.S.C.A. § 7545(o)(1)(L). Although the focus of the program is on transportation fuel, the statute authorizes EPA to issue regulations that extend it to "additional renewable fuels"—a term that includes heating oil. 42 U.S.C.A. § 7545(o)(1)(A), 7545(o)(5)(E). EPA has exercised that authority and extended the RFS program to cover heating oil.

and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel by the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for the relative global warming potential." CAA § 211(o)(1), 42 U.S.C. § 7545(o)(1). To qualify generally as a "renewable fuel," fuels produced from new biorefineries must reduce lifecycle GHG emissions at least 20% when compared to the 2005 baseline average gasoline and diesel fuel they replace (with special rules for refineries in place or under construction when Congress enacted the RFS law). Other renewable fuels must meet the following, more stringent lifecycle GHG thresholds measured as a percent reduction from 2005 baseline gasoline or diesel fuel they replace: advanced biofuel, 50%; biomass-based diesel, 50%; and cellulosic biofuel, 60%.

Thus, to qualify as biomass-based diesel under the RFS program, the producer of the biodiesel must show that the fuel achieves a 50% reduction in lifecycle GHG emissions relative to the 2005 petroleum-based diesel it replaces. The lifecycle analysis considers direct and indirect upstream and downstream emissions associated with the generation, distribution and use of biodiesel. Projects designed to encourage the production, distribution and use of biomass-based diesel thus are consistent with the goal of reducing GHG emissions set forth in the CLCPA.

More generally, the federal government has adopted numerous programs that provide incentives to help build and maintain a market for biodiesel fuel and vehicles. These programs are summarized on the Department of Energy's Alternative Fuels Data Center at: https://afdc.energy.gov/fuels/laws/BIOD. In establishing these programs, the federal government was motivated by various goals, including the desire to reduce GHG emissions by substituting biodiesel for petroleum-based diesel.

New York State Programs to Encourage Use of Biodiesel
Like the federal government, New York State also has adopted programs to encourage the production and use of biodiesel. In 2017, New York State enacted a law—codified at New York Environmental Conservation Law § 19-0327—that requires all heating oil sold for use in buildings in Nassau, Suffolk and Westchester Counties effective July 1, 2018 to contain at least 5% biodiesel. The state law followed a pair of laws adopted by New York City to require heating oil sold for use in buildings in the City to contain a specified quantity of biodiesel. The original law required heating oil to contain at least 2% biodiesel beginning in 2012. In 2016, the City enacted a law increasing the amount of biodiesel in heating oil in the City to at least 5% on October 1, 2017. The blend then moves to 10% in 2026, 15% in 2030, and 20% in 2034. New York City Admin. Code § 24-168.1

GHG Emissions from the Terminal/Project
As previously noted, biodiesel is comparatively viscous. To manage biodiesel at the Terminal, Global must install equipment to heat the fuel to make it more "pumpable." As part of the Project, Global therefore is proposing to install natural gas-fired boilers and heaters to heat biodiesel. Potential CO_2 emissions from this new equipment are estimated at 27,784 tpy assuming the units are operating 8,760 hours per year. In fact, however, the boilers/heaters are expected to operate no more than approximately 25% of the time (up to approximately 2,200 hours per year). The boilers are not expected to operate as often in the summer as in the colder

months. This results in an expected actual increase in GHG emissions of approximately 6,950 tpy.[3]

To provide some context for this number, as discussed in the EAF Supplement, under EPA's Prevention of Significant Deterioration (PSD) program—the attainment equivalent of the nonattainment New Source Review program—EPA adopted special tailored applicability thresholds for new and modified sources of GHGs after concluding that the statutory thresholds for other pollutants were so low that they would result in an unmanageable expansion of the PSD program if applied to GHGs. 75 Fed. Reg. 31514 (June 3, 2010). Although the rule was eventually vacated by the U.S. Supreme Court,[4] it provides a useful basis for assessing the significance of GHG emissions. The so-called "GHG tailoring rule" established a 100,000 tpy major source threshold for GHG emissions measured in CO_2 equivalent, while the significant modification threshold was 75,000 tpy CO_2 equivalent. Facilities/projects with emissions below these thresholds did not trigger PSD for GHGs. As previously noted, GHG emissions from the Project are estimated at only 6,950 tpy, significantly below the 75,000 tpy significance threshold established by EPA under the GHG tailoring rule for modifications.

CLCPA Consistency Assessment

Global is in the business of delivering energy that is needed for daily life. Global recognizes both the ongoing and critical need for energy, and the need to move toward a future with increased renewables. Global is an active participant in the transition to renewable fuels. Nowhere is that more apparent than in Albany, with the proposal to manage biodiesel.

As previously noted, the biodiesel portion of the Project is consistent with the GHG emission reduction goals of the CLCPA because it will enable the Terminal to handle biodiesel—a comparatively climate-friendly fuel. As discussed above, both EPA and New York State have enacted measures designed to encourage the production and use of biodiesel as a replacement for petroleum-based diesel fuel. Of particular note, the RFS program establishes annual production goals for biomass-based diesel for the specific purposes of encouraging production of this fuel. To qualify as biomass-based diesel under the program, the producer of the biodiesel must demonstrate that the fuel's lifecycle GHG emissions are at least 50% less than its petroleum-based counterpart. In other words, biodiesel regulated under the RFS program generates 50% less GHGs than regular petroleum diesel. The RFS program reflects a desire by EPA to encourage production of biomass-based diesel for the purpose of reducing GHG emissions and addressing the problem of climate change.

---

[3] Note that these GHG estimates vary slightly from what was in the EAF Supplement as boiler and heater capacities have since been finalized.

[4] The Supreme Court in *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014) concluded that while GHGs may properly be considered pollutants for purposes of the Clean Air Act, EPA was not barred from interpreting the term within its statutory context and excluding atypical pollutants, such as GHGs, that are emitted in such large quantities that their inclusion would make the Act unworkable. The court went on to find that including GHGs under the PSD program was unreasonable both because it would place a huge administrative burden on permitting agencies and because it triggered a transformative expansion of EPA's regulatory authority without clear congressional authorization. The decision thus was based on a finding that GHGs (in particular, CO_2) are emitted in significantly larger quantities than other pollutants and must be evaluated accordingly.

At the state/local level both the New York State legislature and New York City have adopted laws mandating the addition of biodiesel to home heating oil. Like the RFS program, these laws reflect a determination that biodiesel is preferable to its petroleum-based counterpart from a climate change perspective.

Accordingly, while the on-site management of biodiesel at the Terminal will result in emissions of GHGs, the adverse impacts of these additional emissions from a climate change perspective are more than outweighed by the benefits associated with facilitating the use of biodiesel in the State. Accordingly, the Project is consistent with the goals of the CLCPA.

Throughput Reductions

As part of the Project, Global is proposing to reduce the overall allowable throughput at the Terminal 27% from 3,329 million gallons to 2,379 million gallons, a 950 million gallon decrease. In particular, the Project calls for Global to reduce its existing cap on crude oil throughput by over 75%, from 1,850 million gallons to 450 million gallons, while increasing the cap on loading refined products by 450 million gallons.

From a climate change perspective, these changes represent a significant reduction in the total quantity of fossil fuels that can potentially be managed by the Terminal and thus the quantity of potential GHG emissions associated with those on-site management activities. From a broader perspective, reducing the quantity of product allowed to be managed at the Terminal decreases the amount of product Global can potentially distribute to customers. In essence, Global will no longer be associated in any way with the lifecycle GHG emissions associated with up to 950 million gallons of petroleum products. While the product may still be produced (generating GHG emissions associated with extraction and refining) and combusted, the Terminal will not play a role in that process.

Other Project Components

As set forth in the EAF Supplement, Global is proposing several other changes at the Terminal designed to improve Terminal operation and enhance the ability of Global to respond to changes in the market for its products.

Reconfiguration of Throughput Caps

As part of the Project, Global is proposing to reconfigure its throughput caps to allow for greater flexibility to respond to market changes. Currently, loading of gasoline and ethanol at the Terminal is capped at each of three loading areas: the truck loading rack, the rail loading rack, and the marine dock. Loading of distillate products (including diesel fuel, heating oil and kerosene) is capped on a facility-wide basis. The Project includes the addition of a facility-wide cap that incorporates all refined products (including gasoline, ethanol, distillates, blendstocks, and biodiesel) as well as a reconfiguration of the existing sub-caps at each of the loading areas. This reconfiguration of the caps will allow flexibility in the type and volume of products distributed at the individual loading areas to adjust to changing market conditions, while ensuring against major changes in truck or rail traffic. (See Section 2.3 of the EAF Supplement for a detailed discussion of the changes to the throughput caps at the Terminal.) The reconfiguration of the throughput caps is not expected to impact the Terminal's potential

GHG emissions. Moreover, as set forth above, Global is lowering the allowable Terminal throughput by 950 million gallons, a significant reduction.

Loading Rack Modifications
Global is proposing to add loading positions to its truck and rail racks to reduce wait times at the truck rack and the need to move railcars during loading. Currently, the truck loading rack is equipped with eight loading positions. Operation of the truck loading rack can become congested and is constrained during daily busy periods. The Project includes the addition of two loading positions to the truck loading rack to improve efficiency and reduce customer wait time and truck idling time.

The rail loading rack is currently equipped with eight loading positions. Since the rail loading area can accommodate up to fifteen railcars, loading all fifteen cars can require a locomotive to move the loaded cars out of the loading positions and move the empty cars into position. To improve efficiency and reduce locomotive use, the Project includes the addition of seven loading positions at the rail loading rack. The additional loading positions are not designed to increase the loading rate at the rack but will allow railcars to be loaded more efficiently and eliminate the need for interim movement of railcars to load certain trains.

The addition of new truck loading positions will not increase the overall amount of gasoline that can be throughput at the rack (which is capped as set forth above at current levels). However, the additional loading positions will enable Global to eliminate bottlenecks at the truck loading rack that occur at certain times of the day. This will decrease the amount of truck idling at the Terminal. Likewise, the addition of loading positions at the rail loading rack will allow Global to load a train more quickly while reducing the amount of movement required to situate the cars being loaded. This reduces the amount of time locomotives must be operated during the loading process.

Enhanced Air Emission Controls
Global is proposing to install a vacuum enhanced control system at the rail loading rack to ensure negative pressure loading, a change which will significantly reduce, if not eliminate, fugitive emissions from rail loading. While this change may increase GHG emissions by increasing the quantity of vapor combusted by the VCU, the increase is more than justified by the benefit to the community of reducing fugitive VOC emissions from the rail loading rack.

CLCPA Consistency Assessment
The throughput reduction/operational flexibility component of the Project is "consistent with the statutory statewide GHG emission limits" set forth in the CLCPA. The Project will reduce allowable throughput at the Terminal by 950 million gallons or approximately 27% from current allowable levels. This represents a reduction in potential emissions at the Terminal associated with management of product onsite. More broadly, the reduction means that the Global Terminal will no longer be involved in the management of 950 million gallons of petroleum and related products. The remaining components of the Project (reconfiguration of throughput caps, addition of loading positions, and enhanced air pollution controls) will collectively have little impact on potential GHG emissions at the Terminal.

Overall, these components of the Project are consistent with the goals of the CLCPA. The Project reduces the total quantity of petroleum and related products that can be managed at the Terminal and will replace a percentage of petroleum fuel with biodiesel and thus is consistent with the CLCPA goal of transitioning away from fossil fuels. The remaining changes are designed to reduce emissions and/or improve the efficiency of the Terminal's operations. Overall, these changes will reduce potential GHG emissions at the Terminal. Equally important, these changes will enable the Terminal to better adapt to market changes. New York is currently in the early stages of implementing the CLCPA. In the next 10 years, the market for fossil fuels in the State is likely to shift dramatically as measures to achieve the CLCPA goals are adopted. By reconfiguring the Terminal to allow Global to easily transition from one type of product to another, the Project will allow the Terminal to more efficiently respond to changes in the market, including the shift to more climate-friendly fuels.

Conclusion

As set forth in greater detail above, the proposed Project is consistent with the goals of the CLCPA. For a modest investment, the Project will: (1) reduce potential product throughput at the Terminal; (2) enable the Terminal to manage biodiesel, an important climate-friendly substitute for petroleum diesel as the State transitions away from fossil fuels; and (3) enhance the Terminal's ability to respond to changes during the transition toward a reduced carbon economy contemplated by the CLCPA.

Community Risk and Resiliency Act (CRRA)

Section 9 of the 2019 CLCPA added a new Section 17-b to the Community Risk and Resiliency Act, which provides that major permits for certain regulatory programs (including air) "shall require applicants to demonstrate that future physical climate risk has been considered." In reviewing such information, DEC has the authority require the applicant to "mitigate significant risks to public infrastructure and/or services, private property not owned by the applicant, adverse impacts to disadvantaged communities, and/or natural resources in the vicinity of the project." . . . Please clarify the discussion on pages 53 and 54 of the EAF is in consideration of future climate risk as required by Section 17-b of the Community Risk and Resiliency Act, as enacted by Section 9 of the CLCPA.

Response: The discussion on pages 53 and 54 of the EAF Supplement was in consideration of future climate risk as required by Section 17-b of the CRRA, as enacted by Section 9 of the CLCPA. As discussed in Section 12.2 of Global's EAF Supplement, based on the most recent Federal Emergency Management Agency (FEMA) map of the Terminal site (Map No. 36001CO194D, Effective March 16, 2015), the majority of the Terminal site is located within the 100-year floodplain of the Hudson River. For purposes of the CRRA regulations set forth at 6 NYCRR Part 490 identifying sea level rise potentials, the City of Albany (including the Terminal location) is in the Mid-Hudson Region.

Section 9 of the 2019 CLCPA requires applicants "to demonstrate that future physical climate risk has been considered" in conjunction with the particular project under review. With respect to the Project, the only additional physical risk from a climate change perspective is the increased risk of flooding attributable to climate change-related sea level rise. However, the additional risk to the Project posed by flooding is limited to the destruction of the Project-related equipment. As discussed in the EAF Supplement, Global is proposing to install several exempt boilers and heaters to manage biodiesel, as well as additional loading positions at the truck and rail racks. This additional equipment will be located within the existing Terminal footprint and will be protected to the same extent as comparable equipment already in place. Moreover, all of the new heating equipment will be located inside existing buildings providing further protection against flooding. Equipment containing oil, such as small process tanks associated with the hot oil heating systems will be installed in accordance with major oil storage facility (MOSF) requirements for tanks within floodplains, as applicable.

With respect to flood risks, the Project does not call for the placement of fill or other encroachments into floodways or floodplains. It also does not call for any other changes to the configuration of the property that could raise base flood elevations or otherwise impact the potential path of floodwaters. Accordingly, the Project will not change the flooding-related risk to the Terminal or to any nearby properties.

In light of the above, the only potential climate-change risk associated with the Project is a financial one. In the event sea level rise increases the risk of flooding, Global faces an increased risk that the equipment installed as part of the Project will be damaged or destroyed. No other climate-related risks to the Project are anticipated.

No measures are required to "mitigate significant risks" identified in Section 17-b of the CRRA as follows.

- *Risks to public infrastructure and/or services.* The Project will not affect public infrastructure and/or services.
- *Risks to private property not owned by the applicant.* The Project will not affect private property not owned by Global.
- *Adverse impacts to disadvantaged communities.* The Project will not pose a "significant risk" to disadvantaged communities. As set forth in the Section 14.0 of the EAF Supplement, the Terminal is located in an industrial area near several environmental justice communities. The EAF and accompanying EAF Supplement show that the Project will not have an adverse impact on these communities, let alone pose "significant risks" relating to climate change that could potentially require mitigation. As previously noted, to ensure the communities adjoining the Terminal are provided with opportunities to learn about and comment on the Project, Global has prepared a comprehensive PPP to facilitate community outreach. This outreach should help ensure that possible adverse impacts to disadvantaged communities are identified and addressed.
- *Natural resources in the vicinity of the project.* As discussed in Section 8.0 of the EAF Supplement, the Project will be located at an existing industrial facility that has been in continuous operation since at least the 1920s. The area in the vicinity of the Project likewise has been urban/industrial for many decades. As a result, there are few natural resources at or near the site of the Project other than the Hudson River. Construction and operation of the Project will not affect the Hudson River. It also will not require the removal or destruction of on-shore vegetation or fauna or otherwise impact any

significant habitat areas or other natural resources. Accordingly, no mitigation is required to address natural resource impacts.

Truck Traffic:

1. Based on the application, the truck rack could have a potential of a combined 879,300,000 gallons per year (round up to 880,000,000 gallons per year for the sub-cap). It appears that truck traffic may increase due to rounding. Please clarify whether truck traffic will increase, or will remain the same (or less) with this proposal.

   Response: Potential truck traffic will remain the same with this proposal. Global will seek a subcap of 879,300,000, which reflects the sum of the existing throughput caps at the Terminal truck rack. This cap will ensure that potential truck traffic at the Terminal cannot exceed current permitted levels despite the changes contemplated by Global's operational flexibility proposal. The 880,000,000 gallon per year cap was the result of rounding but has been revised to the original number.

Air Application Technical Review:

1. Provide backup and justification for Project Emission Potential Calculations. Limits utilized, key emission factors, and basis of calculations description.

   Response: Additional notes and descriptions have been added to a revised Project Emission Potential (PEP), included as Attachment RFAI-C. As described in Note 1 on Page 1 of the PEP, the 1.9283 billion gallons of refined product is distributed across all internal floating roof (IFR) tanks as Conventional Gasoline to determine working losses from gasoline throughput. In addition, 506.54 million gallons of blendstock/component is distributed across the previously permitted blending project IFR tanks to calculate working losses. This throughput was the previously permitted tank throughput from the blending project. These working losses are in addition to the gasoline working losses, even though the throughputs are not additive. This was done to ensure a conservative emissions estimate. The crude oil throughput of 450 million gallons was distributed across all IFR tanks and included in the working losses. Crude oil has a separate throughput limit in the permit.

   Standing losses from all IFR tanks were assumed to be gasoline or blendstock/component. For example, if the tank is permitted for blendstock, the standing losses were calculated as blendstock. If the tank is permitted for other refined products or crude, the standing losses were calculated as gasoline. Emissions are highest for blendstock due to the assumption that it has a Reid vapor pressure (RVP) of 15 psi all year. Gasoline was assumed to have an annual average RVP of 13 psi. Both result in higher standing losses than crude oil, which was assumed to have an annual average RVP of 12.5 psi. All distillate tanks (non-IFR) were calculated with distillate standing losses. Working losses are not considered for distillate tanks because it is more conservative to assume the entire 1.9283 billion gallons of refined product is gasoline.

   As described in Note 2 on Page 1 of the PEP, the 1.9283 billion gallon throughput limit of refined project was included in the PEP. The total throughput was modeled as follows:

- 879.3 million gallons of conventional gasoline or lower RVP product at the truck loading rack loaded under negative pressure (i.e., with a "vac assist") and the vapor recovery unit (VRU) at 2 mg/L;
- 300 million gallons of conventional gasoline or lower RVP product at the rail loading rack with a vac assist and the vapor combustion unit (VCU) at 2 mg/L;
- 380 million gallons of blendstock at the marine loading dock with a vac assist and the VCU at 2 mg/L; and
- The remaining 369 million gallons of conventional gasoline or lower RVP product (1,9283-879.3-300-380) at the marine loading dock with a vac assist and the VCU at 2 mg/L.

Although up to 900 million gallons of refined product may be loaded at the marine dock, the PEP scenario described above maximizes throughput at the truck rack first because the truck rack has the lowest baseline emissions, thus maximizing the PEP. The next lowest baseline was the rail rack followed by the marine dock. This reasoning provides for a conservative approach since it minimizes the benefit of the baseline emissions and therefore maximizes the PEP.

Throughput totals have been added to the PEP for additional clarity. References to calculations have also been added and the calculations include references to emissions factors and the basis of calculations. See Attachment RFAI-C for details.

2. Please provide justification of Bakken Crude emissions factor utilized in calculations for marine loading, vapor pressure curve, lab test results and any other relevant information.

   Response: A Bakken Crude emissions factor was not needed for calculating emissions for marine loading. First, there will be no fugitive emissions from the marine loading under normal loading because of the vac assist. Second, potential to emit (PTE) calculations were based on the permitted rating of the control device of 2 mg/L. Under these circumstances, no emission factor for Bakken Crude is necessary. Calculations are shown on Page 21 of the revised PTE calculations included as Attachment RFAI-D. The formula in the PTE is from AP-42 and uses a vapor pressure of 12.5 psi for Bakken Crude. However, while the emissions factor is calculated and shown, it is not used in the PTE since there are no fugitive emissions.

   Emissions from loading without the vac assist system (when loading inerted vessels) were calculated assuming gasoline, which is more conservative, in order to simplify the ratios used for the proposed permit conditions. This is further discussed in response to Question 3 below.

3. Please provide justification for alternative operating scenario formula for inerted vessels, truck, rail loading if vapor assist system is not utilized or is offline.

   Response: Ratios were used to determine the throughput equivalents for the alternate operating scenarios. Pages from the PTE have been highlighted and annotated to illustrate how the ratios were calculated. An example scenario using the formula has also been included. See Attachment RFAI-E for details.

In order to minimize the number of ratios in the permit, and to be conservative, the gasoline ratio of 0.81 was used for crude marine loading of inerted vessels since the emission factor for gasoline is higher than the emission factor for Bakken crude. Therefore, the Bakken crude emission factor was not used in the calculations, as discussed in the response to Comment 2.

4. Provide justification of tank calculations to include possible between tank transfers not captured by current PTE.

   Response: Tank to tank transfers are accounted for in the current PTE. The total tank throughput is 2,885,540,000 gallons. This includes 1,929,000,000 gallons of refined product plus 506,540,000 gallons of blendstock plus 450,000,000 gallons of crude oil. The 1,929,000,000 is a rounded refined throughput limit through the Terminal (actual number is 1,928,300,000). The tank throughput of 2,885,540,000 gallons is approximately 21% more than the total permitted rack throughput at the Terminal (2,378,300,000 gallons). Tank throughputs are detailed on Pages 5 and 7 of the Terminal PTE (Attachment RFAI-D) for clarity.

5. There appears to be a discrepancy with truck loading of 650,000,000 gallons per year and 229,300,000 gallons per year = 879,300,000 gallons per year vs 880,000,000 gallons per year. Please clarify.

   Response: Global was originally proposing to round the 879,300,000 gallons per year throughput to 880,000,000 gallons per year. However in order to keep potential truck traffic at the currently permitted levels, Global is proposing to keep the sub-cap at 879,300,000. Revised relevant pages from the permit application are included as Attachment RFAI-F.

6. There appear to be issues with the emission cap formula defined in conditions. VOC and HAP cap emission spreadsheets should be developed with ongoing discussion between the facility and Department. The Department also plans to use facility throughput caps and sub caps in conjunction with overall throughput limits.

   Response:
   Global is uncertain as to what the issue is that is referenced in this comment. There was no emission formula proposed, but rather a throughput formula for alternate operating scenarios. HAP conditions were included in the permit application. A total VOC cap has been proposed as a response to this comment. The proposed VOC capping condition is included as Attachment RFAI-G.

   As discussed in the response to Item 3 above, annotated pages from the PTE illustrating how the equivalent throughput formula was developed are included as Attachment RFAI-E along with example calculations.

7. Page number should be inserted on all pages of application for easier discussion points (ex. Pg 1 of X).

Response: Page numbers have been added to the application pages for clarity. The new Application pages are included as Attachment RFAI-H.

8. Use 11” x 17” paper for those sheets that have small font sizes would be helpful for reading.

   Response: Calculation pages have been provided on 11”x17” paper for clarity.

9. Please incorporate minor modifications with differing colors to indicate changes in the current 2012 issued permit. Please redline the current pending renewal / modification Department for clarity purposes.

   Response: Minor modifications that have been processed since the last permit have been added to the annotated permit, with the exception of the remediation system minor modification from 2015, as there was no existing language pertaining to the system in the current permit. The minor modifications are annotated in a different color for each minor modification. The revised annotated permit is included as attachment RFAI-I.

Many thanks for your attention to this matter. If you have any questions, or require any further information, please do not hesitate to call or email.

Very truly yours,

Tom Keefe
VP, EHS

Enclosures

ATTACHMENT B
Responses to September 11, 2020 Request for Additional Information
CLCPA Elements – December 3, 2020
Non CLCPA Elements – December 16, 2020

Global Companies LLC., 800 South Street, P.O. Box 9161, Waltham, MA 02454-9161 ph: 781-894-8800

December 3, 2020

VIA E-MAIL
Angelika.Stewart@dec.ny.gov

Angelika Stewart
New York State Department of
Environmental Conservation
Division of Environmental Permits, Region 4
1130 North Westcott Road
Schenectady, NY 12306-2014

RE: Request for Additional Information Related to the 2019 Climate Leadership and Community Protection Act
Global Companies, Albany Terminal
Air Title V Permit Application
DEC #4-0101-00112/00029
City of Albany, Albany County

Dear Ms. Stewart:

Global Companies LLC (Global or Applicant) is submitting this letter in response to DEC's September 11, 2020 Request for Additional Information concerning Global's application to renew and modify its existing Title V air permit for the Albany Terminal (hereinafter "Secord RFAI"). This letter focuses solely on the section of the request entitled "Greenhouse Gas Emission Reduction Consistency Analysis." In the request, DEC asks Global to expand upon its analysis of the consistency of the proposed modification as it relates to the goals of the 2019 Climate Leadership and Community Protection Act (CLCPA), as set forth in Global's July 7, 2020 response to DEC's first Request for Additional Information, dated May 19, 2020 (hereinafter "First RFAI"). The remainder of the response to DEC's Second RFAI will be addressed in a separate submission.

In brief, Global has proposed the following modifications to its Albany Terminal as set forth in its Title V permit renewal/modification application: (1) reduce allowable crude oil throughput from 1,850 to 450 million gallons (a 1,400 million gallon reduction, or about 75%) while reducing overall product throughput at the Terminal by 950 million gallons (a 27% reduction); (2) install exempt natural gas-fired boilers/heaters to enable the Terminal to manage biodiesel; (3) accept stricter emission limits on several of the Terminal's existing air pollution controls and install a new vacuum assist system ("vac assist") to reduce, if not eliminate, fugitive emissions at the railcar loading rack; (4) reconfigure the Terminal's existing throughput caps to enable the Terminal to better respond to market demand; and (5) add loading arms at the truck and railcar loading racks to reduce unnecessary truck idling and railcar movement, respectively (collectively, the "Project").

The First RFAI asked Global to assess the consistency of the Project with the CLCPA, which is codified primarily at New York Environmental Conservation Law (ECL) Article 75. In response, Global focused its analysis on the biodiesel handling and storage aspect of the Project because the boilers/heaters required to manage biodiesel are the only significant source of greenhouse gas (GHG) emissions associated with the Project. The First RFAI response described the biodiesel component of the Project in greater detail; summarized the federal and state programs intended to encourage the use of biodiesel, a low-carbon fuel; described the GHG emissions associated with the biodiesel component of the Project; and explained that the biodiesel component of the Project facilitates the management of biodiesel and is therefore consistent with the goals of the CLCPA.

In the Second RFAI, DEC has expanded on its request for information relevant to the consistency analysis. Global submits this second response, as it did the first response, without the benefit of final CLCPA regulations or Department-wide guidance on implementation of the CLCPA prior to the adoption of regulations. Key information sought by the Second RFAI is discussed below. The expanded analysis shows that the changes Global is proposing support the State of New York's GHG reduction goals. Global's proposed Project aligns with the State's objectives in the following ways:

- Global will voluntarily reduce its total product throughput cap by 27% and reduce its crude oil throughput cap by 75%, which is consistent with the State's goal of reducing reliance on fossil fuel and decreasing GHG emissions.
- Global will enhance its ability to manage biodiesel, a fuel that is key to the transition away from fossil fuel and reduces overall GHG emissions.

In order to manage biodiesel, Global will need to install natural gas-fired boilers and heaters to heat biodiesel so it will flow in colder weather. No other products, including crude oil, will be heated. The biodiesel component of the Project (which includes the boilers/heaters required to manage the biodiesel) will result in a significant reduction in overall GHG emissions based on the lifecycle GHG emission reductions associated with the substitution of biodiesel for petroleum diesel and is consistent with the CLCPA goal of reducing GHG emissions 40% below 1990 levels by 2030. The more biodiesel the Terminal handles, the greater the benefits of the Project from a climate change perspective.

Allowable GHG Emissions Before and After the Project (Excluding New Boilers/Heaters Required to Manage Biodiesel)

As set forth in greater detail in Global's First RFAI response, the Albany Terminal essentially functions as a fuel warehouse. Fuel is purchased from one location, stored at the Terminal and then shipped in bulk to entities who may either use it themselves or sell it to a third-party consumer. In the case of heating oil, the fuel may be burned by a residential, commercial or industrial source in the state or eventually consumed out of state. Likewise, gasoline shipped from the Terminal may eventually be sold and consumed either in state or out of state. The Global Terminal functions as a conduit for product, providing a link between the producer and the end-user. In this way, the Terminal is no different from a traditional wholesale distribution center, which collects products from various producers and then ships them to other wholesalers and/or retailers.

In determining the carbon dioxide equivalent (CO_2e) emissions from the Project, the Second RFAI asks Global to consider the impacts of the 27% reduction in overall allowable throughput at the Terminal from 3.329 million gallons to 2.379 million gallons as well as the impact of the Project's reduction in crude oil throughput from 1,850 million gallons to 450 million gallons. In essence, DEC is asking Global to quantify the potential GHG emissions associated with the storage and distribution of product throughput at the Terminal before and after the requested Title V permit modification is approved. These emissions include GHG emissions associated with day-to-day operation of the Terminal, in particular, carbon dioxide (CO_2) emissions associated with existing on-site fuel handling operations, etc.

The CLCPA regulates six pollutants as GHGs: CO_2, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride and assigns each GHG a CO_2 equivalent. The Terminal does not emit perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride. Accordingly, these GHGs are not addressed in the analysis.

As discussed in greater detail below, total GHG emissions from the Terminal are relatively low. These emissions originate almost exclusively from two sources—operation of the Terminal vapor combustion units (VCUs), which are used to control emissions of volatile organic compounds such as benzene associated with the Terminal's loading activities and—to a much lesser extent—miscellaneous small combustion equipment (e.g., office, garage and other similar boilers). The estimated emissions relating to the Project are set forth below.[1] All emissions are measured in tons per year (tpy). Information about how the emissions below were calculated can be found in Attachment A, which includes the Potential to Emit (PTE) for the Terminal's combustion sources.

Current Potential Emissions (based on allowable throughput):
CO_2: 18,338.9 tpy
Methane: 0.34 tpy
Nitrous Oxide: 0.35 tpy
Total CO_2e: 18,450.5 tpy

Future Potential Emissions (based on proposed allowable throughput excluding new boilers and heaters):
CO_2: 16,656.7 tpy
Methane: 0.32 tpy
Nitrous Oxide: 0.30 tpy
Total CO_2e: 16,755.7 tpy

[1] These numbers do not include emissions from the existing small boilers/furnaces used primarily to heat various parts of the Terminal (e.g., office, garage, water treatment building). The activities associated with this equipment—which have the potential to emit approximately 544.41 tons per year of CO_2e—will not change in any way as a result of the Project and so should not be considered in assessing the consistency of the Project with the CLCPA.

As set forth above and in Attachment A, the reduction in allowable Terminal throughput and other "non-boiler/heater" components of the Project reduce GHG emissions by approximately 1,694.8 tpy.[2]

GHG Emissions Associated with New Boilers/Heaters Required to Manage Biodiesel

The production and use of biofuel is encouraged by both federal and state programs, in large part because of its climate change benefits. As discussed in the response to the First RFAI, fuel producers and importers are regulated under EPA's Renewable Fuel Standards (RFS) program, which requires them to include increasing amounts of comparatively climate-friendly fuels, such as biodiesel, in transportation and other fuels, including home heating oil. In deciding whether a particular fuel qualifies as renewable fuel, advanced biofuel, biomass-based diesel, or cellulosic biofuel under the RFS program, EPA must conduct an analysis of the lifecycle GHG emissions associated with the fuel to determine whether the fuel meets the threshold in the statute for the fuel type. To qualify as biomass-based diesel under the RFS program, the producer/importer must show that the particular type of diesel fuel has lifecycle GHG emissions that are at least 50% lower than comparable petroleum diesel and meets other criteria spelled out in the RFS regulations. To qualify generally as "renewable fuel," the fuel must have lifecycle GHG emissions that are at least 20% less than the baseline fuel it replaces and meet other criteria spelled out in the regulations. See 40 CFR § 80.1401 for the relevant definitions. See the First RFAI response for additional information about the RFS program as it relates to the Global Project.

New York State and New York City have adopted laws requiring the inclusion of biodiesel in home heating oil in the downstate area. Other nearby states, including Massachusetts and Rhode Island, also have adopted laws encouraging the use of biodiesel. Global has played a key role in the distribution of biodiesel in the Northeast for many years. As the focus of many states shifts to increasing the use of biodiesel, Global has expanded the availability of biodiesel within its terminal network and continues to look for additional opportunities to facilitate greater use of biodiesel consistent with the various statutory mandates. Global is currently working with the United States Department of Agriculture under the Higher Blends Infrastructure Incentive Program (HBIIP). The HBIIP is designed to expand the sale and use of ethanol and biodiesel fuels by providing financial incentives to fuel suppliers to purchase equipment and make other changes designed to facilitate the management of renewable fuels. Global's current plan is to install biodiesel infrastructure not only at the Albany Terminal, but at several other terminals within New York and the Northeast states to increase the availability of biodiesel.

Heating oil will remain a key component of the energy landscape in the Northeast for the foreseeable future. According to the U.S. Energy Information Administration, in 2018

---

[2] The Second RFAI requests that Global use the emission factors in 40 CFR Part 98 to calculate GHG emissions from the Project. However, petroleum terminals are not among sources covered by EPA's GHG reporting program. Moreover, as set forth below, the key issue for purposes of assessing the GHG impact of the Project are the GHG benefits of biodiesel relative to the "costs" (i.e., GHG emissions) associated with operating the boiler/heaters needed to manage the biodiesel on-site. For purposes of that analysis, Global has relied on emission factors established under the Renewable Fuel Standards program, which more accurately reflect the relative merits of petroleum versus bio-based fuels on a lifecycle basis.

approximately 5.5 million households in the United States used heating oil as their main heating source, about 82% of which are located in the Northeast. Not surprisingly, New York is ranked first among the Northeastern states in residential heating oil consumption.[3] Accordingly, it is crucial to find ways to "decarbonize" heating oil until the homes that rely on it for heat can transition to another heating source. Biodiesel is a pathway to lowering the carbon footprint of heating oil and achieving the short-term goals of the CLCPA. To manage biodiesel in the cold climate of the Northeast, the fuel must be stored and heated.

In the Second RFAI, DEC asked for additional information about the GHG emission impacts of managing biodiesel at the Terminal. In particular, DEC asked about the status of the biodiesel managed by Global under the RFS program (in particular, whether Global's biodiesel meets the 50% threshold for biomass-based diesel), Global currently stores and distributes biodiesel blends within its terminal network which only contain biodiesel that qualifies as "biomass-based diesel" under the RFS program.[4] This biodiesel emits a *minimum* of 50% less lifecycle GHGs than the petroleum diesel it replaces. In fact, certain biodiesel fuels that qualify as biomass-based diesel achieve lifecycle GHG emission reductions relative to petroleum diesel that exceed the 50% reduction threshold. To be conservative for purposes of the CLCPA analysis, however, Global has assumed that the biodiesel it will manage using the boilers/heaters meets the less stringent 20% threshold for renewable fuels.

A review of the lifecycle GHG emissions associated with petroleum versus biodiesel shows that the comparatively modest potential GHG emissions associated with operating the natural gas-fired boilers/heaters needed to manage the biodiesel will be more than offset by the GHG benefits of switching from petroleum to biomass-based diesel even if it is assumed that the biofuel meets only the 20% lifecycle reduction threshold for renewable fuel.

Per the Second RFAI, the CLCPA requires DEC—in considering Global's application to significantly reduce product throughput and install boilers/heaters to manage biodiesel—to confirm whether its decision on the application will be inconsistent with or interfere with the attainment of the Act's statewide GHG emission reduction limits. These limits—which were recently proposed by DEC—quantify the CLCPA's goal of reducing GHG emissions 40% below 1990 levels by 2030. To answer this inquiry, Global compared the GHG benefits associated with swapping biodiesel for petroleum diesel (i.e., distillate) with the additional GHG emissions associated with the combustion of the natural gas used to fuel the boilers/heaters needed to manage the biodiesel at the Terminal. As previously noted, although Global currently handles only biodiesel that meets the 50% minimum threshold for biomass-based diesel, Global conducted its analysis using the 20% threshold for renewable fuels. In other words, Global calculated the GHG emission benefits associated with biodiesel assuming a 20% reduction from the lifecycle GHG emissions of distillate fuel. The emission factor for the lifecycle GHG emissions of distillate was

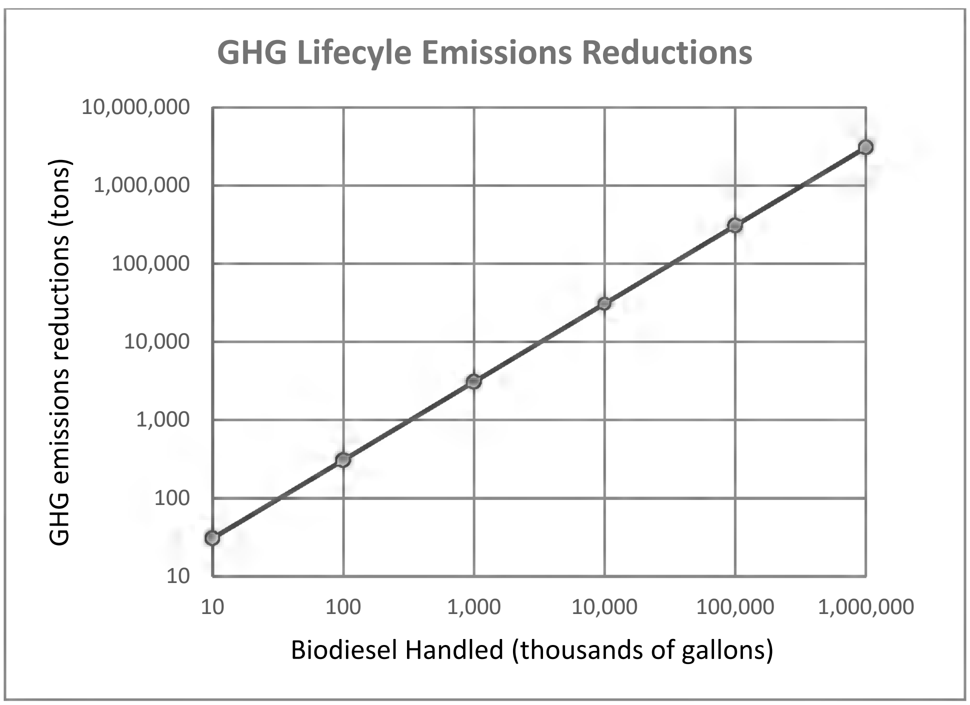
---

[3] https://www.eia.gov/energyexplained/heating-oil/use-of-heating-oil.php.

[4] In particular, Global either buys biodiesel with biomass-based diesel renewable identification numbers (RINs) already attached or acquires biomass-based diesel RINs in the marketplace after the biodiesel has been purchased. In either case, the biodiesel acquired by Global is backed by RINs that satisfy the requirements for biomass-based diesel under the RFS program.

taken from the EPA summary of the lifecycle GHG analyses that EPA undertook for the RFS program. On a per gallon basis, each gallon of biodiesel loaded emits approximately 6 lbs. of lifecycle CO_2e emissions less than petroleum distillate assuming the biodiesel is regulated only as renewable fuel (i.e., is subject to the 20% threshold under the RFS program). Obviously, the GHG benefit is much greater for biodiesel that is classified as biomass-based diesel and subject to the 50% reduction threshold. Relevant calculations are included as Attachment B. The example provided in Attachment B shows that Global would need to replace approximately 12,742,280 gallons of diesel with biodiesel to achieve emission reductions of CO_2e equivalent to a 40% reduction from pre-Project baseline emissions. Attachment B also clearly shows that the potential GHG emissions associated with operating the boilers/heaters at full capacity are more than outweighed by the GHG benefits of burning biodiesel rather than petroleum diesel.

The graph below illustrates the relationship between GHG emissions from the boilers/ heaters needed to manage biodiesel at the Terminal and the GHG benefits associated with biodiesel versus petroleum diesel. A value was created by dividing the 27,784 tons of GHG emissions from the boilers/heaters by the maximum volume of biodiesel product that can be managed at the Terminal (about 300 million gallons). The boiler/heater GHG emissions were then deducted from the lifecycle GHG emission reductions to obtain an estimate of the per gallon GHG benefits of biodiesel relative to petroleum diesel taking the boiler/heater emissions into account. The results were then plotted for different levels of biodiesel product.



The information provided clearly shows that the Project will have a significant climate change benefit since it will enable the Terminal to manage fuel with much lower lifecycle CO_2e emissions and that these benefits more than outweigh the additional emissions associated with operating the boilers/heaters needed to manage those fuels.

It is worth noting that requiring Global to conduct a CLCPA analysis effectively penalizes the company for seeking approval of all components of the current Project as one Title V permit modification. Because the boilers/heaters associated with the biodiesel component of the Project are exempt from permitting under Title V, Global could have installed them without seeking DEC approval, and without triggering review under the CLCPA. Because Global is presenting the entire Project to DEC as a single "package," it is compelled to conduct a CLCPA analysis that may not otherwise have been required owing to the GHG emission reductions associated with the remainder of the Project.

Emissions Associated with Extraction/Transmission of Electricity and Fuels Imported Into State

The Second RFAI states that "The Department must consider GHGs emissions produced within the state from the project and GHGs emissions resulting from the project that are produced outside of the state that are associated with the generation of electricity imported into the state or the extraction and transmission of fossil fuels imported into the state." The statement presumably originates from the CLCPA, which defines "statewide greenhouse gas emissions" as "the total annual emissions of greenhouse gases produced within the state from anthropogenic sources and greenhouse gases produced outside of the state that are associated with the generation of electricity imported into the state and the extraction and transmission of fossil fuels imported into the state. . . . " ECL § 75-0101.13. DEC's decision to include the reference to imports in the Second RFAI suggests that they want Global to quantify out-of-state emissions associated with "imported" electricity and fuels relating to the Project in its CLCPA consistency analysis. Assuming this interpretation of the Second RFAI is correct, this request raises several concerns. First, while the statute speaks generally about the need for the *state* to consider GHG emissions associated with "imports," it does not clearly specify how *sources* are expected to address those emissions. Second, the request could be interpreted as requiring Global to quantify emissions associated with the extraction and transmission of all fuels it "imports" into the State not just those Global consumes, which raises significant concerns.

The discussion of the need to account for electricity and fuel "imports" appears in just two sections of the CLCPA—the definition of "statewide greenhouse gas emissions" quoted above and the discussion of the Statewide Greenhouse Gas Emission Report in ECL § 75-0105.3. Nowhere in the CLCPA does the law specifically require *sources* to supply that information, let alone make them responsible for considering those emissions in assessing the consistency of projects with the CLCPA. Likewise, the recent rulemaking proposing GHG emission limits under the CLCPA addresses only GHG emissions from "imported" electricity and fuels statewide. The rulemaking does not discuss how such emissions are to be addressed with respect to individual facilities/projects. Absent clear regulatory direction, Global should not be required to take emissions associated with these imports into account in assessing the consistency of the Project with the CLCPA. To the extent in-state sources are expected to quantify GHG emissions associated with "imports," the obligation should fall on the electricity/natural gas supplier not the consumer.

The challenge with making sources responsible for quantifying GHG emissions associated with imports is most obvious in the case of imported electricity. An electricity purchaser, such as Global, has no way to determine whether the electricity it uses was generated in-state or imported from out-of-state. Absent such information, electricity purchasers, such as Global, cannot be responsible for considering imported electricity as part of their project-specific CLCPA consistency analyses.

Although the issues relating to natural gas are slightly different, the conclusion is the same. In the case of natural gas, the product is combusted by the consumer. As a result, the consumer—in this case, Global—can reasonably be expected to account for its own direct emissions in assessing its activities under the CLCPA. However, while the consumer can control its own, direct GHG emissions (by operating less, installing more fuel efficient equipment, etc.), it has no control over emissions associated with its extraction and transmission. Accordingly, it should not be accountable for those emissions for purposes of assessing the consistency of a project with the CLCPA.

Another concern with the Second RFAI is that the mention of imported electricity and fuel arguably could be interpreted as requiring Global to quantify the extraction and transmission emissions associated with all the fuel it "imports" into New York State for management at the Terminal not just the fuel it actually combusts on-site. However, DEC's recent rulemaking clarifies that the requirement in ECL § 75-0101 to include emissions associated with the extraction and transmission of fuels imported into the State is limited to fuels consumed in the State. In August, DEC proposed regulations setting statewide GHG emission limits for 2030 and 2050 as required by the Act. The limits include both GHGs produced outside the state that are associated with the generation of electricity imported into the state and those associated with the extraction and transmission of fossil fuels imported into the state. The Regulatory Impact Statement (RIS) accompanying the rulemaking makes clear that the requirement to quantify the GHG emissions associated with fuel imports is limited to fuels imported *and consumed* in the State. For example, the RIS specifies that statewide GHG emissions include "certain sources that are located outside of the state that are associated with *in-state energy consumption*" (emphasis added). Likewise, the discussion of lifecycle or out-of-state emissions refers to "upstream emissions associated with *in-state energy demand and consumption*" (emphasis added). Global does not consume the fuel it imports nor can it say for certain where the fuels it manages are finally consumed (i.e., whether they are consumed in-state or out-of-state). In light of these considerations, Global should not be required to quantify emissions associated with the fuel it "imports" into the State.

Overall Project GHG Consistency Analysis

The Project is consistent with the goals of the CLCPA.

- The Project will reduce allowable crude oil throughput at the Terminal by 1,400 million gallons (75%). This change is consistent with the CLCPA goal of reducing reliance on fossil fuels.
- The Project will reduce overall allowable throughput at the Terminal by 950 million gallons (27%). This change is consistent with the CLCPA goal of reducing reliance on fossil fuels.
- The 950 million gallon reduction in overall Terminal throughput reduces allowable emissions associated with the actual on-site management of product at the Terminal, in particular, the emissions associated with the operation of the VCUs used to limit emissions of benzene and other volatile organic compounds at the Terminal.

- The change in the Terminal's throughput caps will improve operational flexibility as well as Global's ability to respond quickly to changes in the fuel market, many of which will be driven by efforts to implement the CLCPA and handle low-carbon fuels. The CLCPA can be expected to change the mix of fuels available in the marketplace. For example, the goal of reducing GHG emissions may lead to a switch from petroleum to biodiesel. The change in the throughput caps will facilitate achievement of that goal.
- The emission increases from the Project are due *solely* to operation of the boilers/heaters needed to manage biodiesel. As set forth above, the climate benefits associated with managing biodiesel more than outweigh the costs in terms of emissions from the natural gas-fired boilers/heaters needed to manage the biodiesel, even under the conservative assumption that the biodiesel only meets the standard for renewable fuel not the stricter standard for biomass-based diesel. The emission reductions associated with the management of biodiesel are consistent with the CLCPA goal of reducing GHG emissions 40% below 1990 levels by 2030.

Options for Further Reducing GHG Emissions

The Second RFAI asks Global to "discuss whether and in what manner new GHG emissions from the project or any other GHG emissions associated with current operations at the Albany Terminal can be further reduced, such as the use of alternate fuels, electricity, etc. If there are no technologically and economically feasible methods of further reducing GHG emissions, please confirm the same and provide an explanation."

Options for reducing GHG emissions from the Project are limited.

- As noted above, the only increase in GHG emissions associated with the Project is due to the boilers/heaters required to manage biodiesel. These boilers are proposed to be fired using natural gas. Global has investigated the option of installing electric heating in place of the planned natural gas-fired boilers and has determined that electrically heating the tanks is infeasible because electrical heaters cannot supply the energy necessary to adequately heat the product in tanks of the size and diameter of those at the Terminal.
- The vast majority of the GHG emissions relating to current Terminal operations are linked to operation of the VCUs. The VCUs reduce emissions of VOCs, such as benzene, from the Terminal and ensure that the marine loading operations comply with Coast Guard requirements relating to explosion prevention.
- The changes intended to improve operational flexibility (in particular, the replacement of product/loading rack-specific caps with facility-wide caps) do not require Global to purchase new equipment or modify existing equipment. Accordingly, this aspect of the Project provides limited opportunities for Global to implement alternatives to reduce GHG emissions.

DEC has also asked whether "GHG emissions associated with current operations at the Albany Terminal can be further reduced." The Title V permit review process for a modification is limited to an assessment of the emissions implications of the Project. DEC does not require the Applicant to review facility operations that are unaffected by the proposed changes.

The enactment of the CLCPA does not change the scope of the Title V decision-making process. Although the CLCPA may require assessments of GHG emissions from the facility as a whole after implementing regulations are promulgated, no such obligation exists now. CLCPA § 7.2 addressing permits and approvals requires agencies in considering and issuing permits to "consider whether such *decisions* are inconsistent with or will interfere with the attainment of the statewide greenhouse gas emission limits" (emphasis added). The *decision* in this case, is whether to grant Global's Title V permit modification request. Accordingly, the focus must be on those aspects of the modification that have the potential to negatively impact GHG emissions. Global should not now be required to assess GHG reduction options for the entire facility simply because it is seeking permission to make physical changes to small portions of its relatively small Terminal.[5]

Moreover, as noted above, the vast majority of emissions from the Terminal are linked to the operation of the VCUs and proposed boilers/heaters. The remaining combustion equipment at the Terminal is small and emits very little GHGs. As a result, the remaining equipment does not offer opportunities for significant GHG emission reductions.

GHG Mitigation Measures

For the reasons set forth above, the Project is consistent with the GHG emission limits set forth in the CLCPA. Accordingly, no mitigation measures are necessary.

De Minimis Nature of GHG Emissions Associated with the Proposed Project

In the Second RFAI, DEC declares that "neither the Climate Act nor any state regulatory authority presently identifies any specific thresholds for new or modified sources of GHG emissions for the applicability of the Climate Act's statewide GHG emissions limits." While this statement is technically correct, ECL § 75-0103.14(c) specifically authorizes the New York State Climate Action Council to "[t]ake into account the relative contribution of each source or source category to statewide greenhouse gas emissions, and the potential for adverse effects on small businesses, and recommend a de minimis threshold of greenhouse gas emissions below which emission reduction requirements will not apply." This provision reflects a recognition by the Legislature that not all GHG emitting sources should be treated equally and that the Legislature expects the Council to take the quantity of GHG emissions into account when deciding how to treat particular sources or source categories under the CLCPA. Those same considerations should govern DEC's review of individual projects pending full implementation of the CLCPA.

As reported in Global's response to the First RFAI, Global estimates actual emissions from the boilers/heaters needed to manage biodiesel at only 6,950 tons or 6,305 metric tons. By way of

---

[5] In theory, Global's request to reduce its throughput and reconfigure its throughput caps implicates the entire Terminal in the proposed Title V permit modification. However, it makes no sense to require Global to evaluate alternatives for reducing GHG emissions associated with its entire operation simply because it is proposing a change (a significant reduction in total allowable throughput) that provides a climate change benefit and does not require any changes to existing equipment or the purchase of new equipment.

comparison, the Astoria Generating Station in Queens reported 726,414 CO_2e metric tons of GHG emissions in 2018 under EPA's GHG reporting program (40 CFR Part 98). As this comparison shows, the Global Albany Terminal is a comparatively small source of GHG emissions. In determining what type of submission is required to demonstrate consistency with the CLCPA, DEC must consider the relative contribution of the source to the State's GHG emissions.

Conclusion

From a GHG perspective, the Project is comprised of two basic components: the installation of natural gas-fired boilers/heaters to enable the Terminal to manage biodiesel and the remainder of the Project, which includes reductions in crude oil and total product throughput, installation of a new vac assist system to control fugitive emissions from the railcar loading rack, reconfiguration of the Terminal product caps, and installation of additional loading positions. The 75% reduction in allowable crude oil throughput and 27% reduction in allowable total product throughput is consistent with the basic goal of minimizing fossil fuel use in the State. Moreover, as discussed above, the "non-biodiesel" components of the Project reduce possible GHG emissions associated with Terminal operations by reducing allowable product throughput. Although the boilers/heaters needed to manage biodiesel will emit GHGs, these emissions are more than outweighed by the lifecycle GHG benefits associated with biodiesel as compared to the petroleum diesel it replaces. Overall, the Project is consistent with the CLCPA goal of reducing GHG emissions 40% below 1990 levels by 2030.

Global hopes that this submission satisfies the Department's concerns regarding the consistency of its throughput reduction/biomass-based diesel Project with the goals of the CLCPA. If questions or concerns remain, Global would welcome the opportunity to discuss its approach to CLCPA consistency with Department staff in the hopes of resolving any outstanding issues and avoiding the need for multiple future submissions.

Many thanks for your attention to this matter. I look forward to hearing from you.

Very truly yours,

Tom Keefe
Vice President Environmental, Health & Safety

Attachments

Global Companies LLC., 800 South Street, P.O. Box 9161, Waltham, MA 02454-9161 ph: 781-894-8800

December 16, 2020

VIA E-MAIL
Angelika.Stewart@dec.ny.gov

Angelika Stewart
New York State Department of Environmental Conservation
Division of Environmental Permits, Region 4
1130 North Westcott Road
Schenectady, NY 12306-2014

Re: Response to Request for Additional Information (excluding CLCPA)
Global Companies, Albany Terminal
Air Title V Application
DEC #4-0101-00112/00029
City of Albany, Albany County

To Ms. Stewart:

This letter is in response to your letter dated September 11, 2020 regarding the Global Companies Albany Terminal Air Title V Application. Responses to your request for additional information relating to the air permitting and application comments in the letter are provided below. Our response to comments relating to consistency with the Climate Leadership and Community Protection Act (CLCPA) were provided in a separate letter.

Dispersion Modeling

NYSDEC Comment: "The protocol states the version of the proprietary Breeze software that they will be using, but not the version of AERMOD. The modeling report should state the version of AERMOD used, which should be 19191."

Response: The modeling report will state the version of AERMOD utilized in the dispersion modeling. Typically, the version is not specified in the protocol in case a newer version of AERMOD is released prior to completion of the modeling and submission of the report.

NYSDEC Comment: "The protocol proposes to use the urban dispersion option but does not provide details of the land-use analysis that led to that decision. We do not recommend the use of the urban dispersion option outside of the New York City metropolitan area. Rural dispersion should be used. The urban option behaves unpredictably when used with population figures under one million."

Response: The protocol has been revised to account for rural land use, rather than urban, in accordance with the latest version of the NYSDEC DAR-10 guidance. The revised protocol is attached as Appendix A.

NYSDEC Comment: "The protocol proposes to model internal floating-roof tanks as area sources, with the release height equal to the height of the tank. Instead, we request that they be modeled as volume sources, with the release height set to one half the height of the tanks. Area sources are not subject to downwash in AERMOD, and in our judgment a volume source is a better representation of the emission, helping to account for the downwash effect of the tank structure."

Response: Regarding the use of volume source rather than area source assumptions for the tank emissions, it should be clarified that neither of these source options accounts for building downwash. There is an adjustment for the initial vertical dimension for both area and volume sources, which is calculated as follows in the protocol:

$$\text{Initial vertical dimension} = \frac{\text{Release height}}{2.15}$$

In our experience, the results are very similar when assuming elevated area sources for tanks as compared to volume sources. However, given NYSDEC's request to change the assumptions for the tanks for this protocol, the revisions have been made in the revised protocol attached as Appendix A.

Emissions Calculations

NYSDEC Comment: The benzene emissions appear to be a conservative assessment as the consultant used a benzene liquid fraction in refined product (gasoline) of 1.8% which equates to a vapor fraction of 0.41%. In recent years, the highest liquid benzene content in gasoline in the Albany area has been 0.83%.

Response: Although the benzene concentrations are often lower than what was assumed in the potential to emit (PTE) calculations, to be conservative, Global used a more conservative number to account for worst case conditions. Benzene in gasoline was assumed to be 1.3% which is the maximum benzene content allowed in gasoline per 40 CFR 80.

NYSDEC Comment: The hydrogen sulfide (H2S) emissions were based on using a liquid concentration of 10 ppm. Some pipeline carriers of crude oil have H2S limits on transport between 5 – 10 ppm. The H2S content estimate used by Envirospec appears to be a reasonable estimate.

Response: No comment.

NYSDEC Comment: Envirospec accurately accounted for all emission releases from the facilities truck rack VRU, Rail VCU, and Marine two VCUs, and fugitives from the truck rack, barge loading and rail loading. In addition to the routine tank losses (standing, working), Envirospec included losses from landings. They will be assessing short-term impacts from one tank landing at each of the tanks and the tank with the highest emissions will be included in the short-term impacts. Envirospec plans to include all routine tank losses, fugitives, VRU and all VCU releases for the annual impacts and routine tank losses, one-tank landing, fugitives, VRU and all VCU releases for short-term impacts.

Response: No comment.

Other Application Comments

1. Page 13 of 36
Please provide more details regarding how you derived your emission factor for Bakken Crude oil. Laboratory data, TVP and RVP data for Bakken crude to show that emission of gasoline are less and are ratioed appropriately for throughputs.

Response: Extensive vapor pressure sampling was completed by Global when Bakken Crude oil was stored on site. The data was used to develop product specific vapor pressure curves, which are provided as Appendix B. The vapor pressure curves were based on multiple samples of crude oil that were tested for true vapor pressure at four different temperatures – 40 deg F, 60 deg F, 80 deg F and 100 deg F. The purple curve on the graph in Appendix B is not a sample, but was developed from AP-42 Chapter 7, Figure 7.1-13a – True vapor pressure of crude oils with a Reid vapor pressure of 2 to 15 pounds per square inch. The values for true vapor pressure were read from the figure at the same four temperatures for RVP 12.5 psi crude oil for comparison with the Global data. The RVP of 12.5 psi was selected as an annual average RVP of the Bakken crude oil to be consistent with the permit application. As shown on the graph, the true vapor pressure from AP-42 is significantly higher than the actual vapor pressure of the Bakken at all temperatures. When calculating the emission factor for crude oil loading in the PTE, the formula (AP-42 Chapter 5, Section 5.2 Equation 2) uses true vapor pressure. To be conservative, Global used the annual average Reid vapor pressure of 12.5 psi at the annual average ambient temperature. This vapor pressure assumption is significantly higher than any of the measured true vapor pressures at the same annual average ambient temperature. The calculated crude oil emission factor is lower than the gasoline emission factor provided in AP-42 Chapter 5, Table 5.2-2. Therefore, gasoline loading fugitive emissions would be higher and gasoline was used for the loading ratio for crude operating scenario #CRD2 (marine loading of inerted vessels).

2. Page 3 of 36 Emission Summary Sheet
Please supply data on methanol specification sheet for biodiesel that shows methanol content and provide this information for the different grades of biodiesel.

Response: A Safety Data Sheet (SDS) for biodiesel is attached as Appendix C. The ASTM specification for biodiesel can be found at https://afdc.energy.gov/fuels/biodiesel_specifications.html. The ASTM specification shows the maximum concentration of methanol in biodiesel is 0.2%. This standard is for B100, which would have the maximum concentration of methanol, as lower grades of biodiesel are mixed with distillates which do not contain methanol.

3. Page 7 of 36 Throughputs
Please explain where you obtained all throughputs. Fixed roof tanks can only handle distillate. IFR can handle any product. The header labeled Petroleum will be changed to Refined. This should help clarify product throughputs.

Response: Refined product was modeled with working losses and standing losses as the worst-case emissions for each tank. A throughput table is included in the PTE. Emissions from each product that could be stored in a particular tank were calculated and the highest emissions for standing and working losses were used. The column header has been changed for clarity along with an additional note. A copy of the revised PEP and PTE are attached as Appendix D.

4. Page 11 of 36
Clarify and explain the ratioed gasoline/ethanol and that the distillate rail loading is captured in gas truck loading which is worst case scenario.

Response: The gasoline/ethanol is not a ratio. The title has “gasoline/ethanol” because the previous PTE throughput was based on gasoline or ethanol. The headers have been changed to “refined product” to represent the most emissive refined product and footnotes have been added. Refined product loading is calculated at the allowable mg/L limit of the control device and includes the entire allowable refined product throughput at each rack. A copy of the revised PTE is attached as Appendix D.

5. Page 14 of 36
Clarify and explain why this page has zero emissions.

Response: All loading emissions have been calculated as gasoline loading so that any less emissive product (such as distillate products) could be loaded under the refined product throughput cap. A note was added to the attached PTE for clarity for both distillate truck and rail loading. A copy of the revised PTE is attached as Appendix D.

6. Page 19 of 36
Add clarifying notes to this page related to discussion because 99.9% of vapors goes to the VCU because of the nitrogen, and the 3.900 lb/1000 gal comes from AP-42.

Response: Notes were added to the attached PTE for the 99.9%. There are already two notes stating that the 3.9 lb/1000 gallons is from AP-42.

7. Page 20 of 36
Clarify that this page is backup at marine loading, where they have two VCUs.

Response: A note was added to the attached PTE. A copy of the revised PTE is attached as Appendix D.

8. Page 24 of 36 Landings
What product is the worst case product for each tank? Please clarify.

Response: No changes to landings or cleanings calculations were proposed as part of the application and there will be no increase in actual tank landing emissions related to the Project. An emissions cap has been proposed for landing emissions so it would not matter which product is modeled in the PTE. The language for the proposed cap was included in the permit application. The permit condition will require total landing and cleaning emissions to stay under the emissions cap.

9. General
Tanks 4.09D – please remove all references throughout application since AP-42 should be utilized not TANKS 4.09D program which is no longer supported. Please use the in-house spreadsheet to develop calculations.

Response: The references have been removed. AP-42 Chapter 7 (June 2020) were used to calculate tank emissions. A revised PTE is included as Appendix D.

10. General
SCC's – please correct 4-03-101-99. It is not an SCC in this list of codes. Also please use 4-04 codes for bulk terminals. 4-03 references petroleum refineries.

Response: The SCC codes were updated and the revised application forms are attached as Appendix E.

Application Form Comments

NYSDEC Comment: While the Application is submitted on an older application form, the forms have not changed significantly and therefore, the form is acceptable to the Department. However, many of the application form boxes were left incomplete or incorrect. Understandably, some fields do not apply to this facility, but those that do should be completed. For example, on Page 3 of the Application, Biphenyl and Methylphenol are not emitted by the facility, and likely were pre-populated in the application forms in error. Those should be removed. Any information that does not apply to the facility should be noted as n/a.

Response: These compounds are prepopulated on the form. We have removed them. Boxes that are N/A are normally left blank as there are numerous boxes that would need to be populated with N/A. However, the boxes have been populated with N/A per your request. Revised application forms are included as Appendix E.

Full EAF

NYSDEC Comment: Similarly, several boxes and questions on the Full EAF have not been completed or are incomplete. This form should be completed to the full extent applicable and returned with your submission.

Response: Box D.1.c units was unintentionally left blank and has been completed. Most of the other boxes that were not completed were intentionally left blank because the answers were "no" and the rest of the boxes are only applicable "if yes", and therefore the boxes are not applicable.

Other boxes were expanded upon where possible and specific sections of the EAF supplement were added for clarity. The revised Full EAF Form is attached as Appendix F.

Greenhouse Gas Emission Reduction Consistency Analysis

As previously noted, this analysis was provided under separate cover.

We hope that the responses adequately address the Department's concerns. Please call or email if you have any questions concerning this letter.

Very truly yours,

Tom Keefe
Vice President Environmental, Health & Safety

Attachments

ATTACHMENT C
Greenhouse Gas Emissions Calculations

Fuel Combustion Emissions

Existing Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Distillate	Furnace	590			–
NA	Natural Gas	Boiler (water bldg)	–			54
NA	Natural Gas	Boiler (garage)	–			22
NA	Natural Gas	Boiler (office)	–			163
NA	Natural Gas	Furnace	–			120

Proposed Exempt Combustion Sources:

Unit ID	Product	Source	Gal/yr (Liquid)	SCF/yr (Gas)	Liters/year (Gas)	MMBTU/yr
NA	Natural Gas	Heater (line trace)	–			35,040
NA	Natural Gas	Boiler (line trace)	–			35,040
NA	Natural Gas	Boiler (tanks)	–			52,560
NA	Natural Gas	Boiler (lube bldg)	–			86,724
NA	Natural Gas	Boiler (lube bldg)	–			86,724
NA	Natural Gas	Boiler (lube bldg)	–			86,724
NA	Natural Gas	Boiler (lube bldg)	–			86,724

Existing Non-Exempt Combustion Sources:

VCUML/VCUM2/VCURR*	Natural Gas	VCU	–			150,000

*Includes natural gas used as assist gas for both marine VCUs (VCUML and VCUM2) and the rail VCU (VCURR)

Distillate Combustion Emissions:

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Emission Factor - lb/1000 gal*	2.00	2.00	0.21	20.00	0.20	5.00	0.22	0.26	2.2E+04	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1.18	1.18	0.13	11.80	0.12	2.95	0.13	0.15	13157.00	13,208.20
tons/yr	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	6.58	6.60

* Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I. SOx, Nox, CO, and PM Emission Factors are from Table 1.3-1. VOC and CH4 Emission Factors are from Table 1.3-3. CO2 Emission Factor is from Table 1.3-12. N2O Emission Factor is from Table 1.3-8.

** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation (using SOx):
= gal/yr / 1000 gal * Emission Factor
= 590 gal/yr / 1000 gal * 52.54 lb/1000 gal (SOx)
= 31.00 lb/yr

Natural Gas Combustion Emissions (from existing sources)*:

	Combustion Emissions									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG***
Emission Factor - lb / MM BTU**	0.0075	0.0075	0.00059	0.098	0.0054	0.082	0.002	0.002	117.647	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	1,120.32	1,120.32	88.45	14,741.08	810.76	12,382.51	339.04	324.30	17,689,294.12	17,803,390.06
tons/yr	0.56	0.56	0.04	7.37	0.41	6.19	0.17	0.16	8,844.65	8,901.70

*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 are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Tables 1.4-1, 1.4-2, and 1.4-3, except for GHG.
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Total Natural Gas Used 150,359 MMBTU/yr

Example Calculation (using SOx):
= Total Natural Gas Used * Emission Factor
= Total Natural Gas Used (150,359) MMBTU/yr * 0.00059 lb / MM BTU
= 117.86 lb/yr

Natural Gas Combustion Emissions (from proposed sources)*:

	Combustion Emissions									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG***
Emission Factor - lb / MM BTU**	0.0075	0.0075	0.00059	0.098	0.0054	0.082	0.002	0.002	117.647	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	3,498.50	3,498.50	276.20	46,032.94	2,531.81	38,667.67	1,058.76	1,012.72	55,239,529.41	55,595,824.38
tons/yr	1.75	1.75	0.14	23.02	1.27	19.33	0.53	0.51	27,619.76	27,797.91

*Total emissions from natural gas combustion from proposed sources include emissions from the combustion of natural gas in proposed boilers.
** Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I, Tables 1.4-1, 1.4-2, and 1.4-3, except for GHG.
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Total Natural Gas Used 469536.00 MMBTU/yr

Example Calculation (using SOx):
= Total Natural Gas Used * Emission Factor
= Total Natural Gas Used (469,536) MMBTU/yr * 0.00059 lb / MM BTU
= 276.2 lb/yr

VCU Vapor Combustion Emissions
(Emissions from Combustion of Petroleum Product Loaded)

Petroleum Vapor Combusted (lbs):

6,215,882 Total
3,510,000 at VCUML (gasoline and ethanol loading) (See Marine Loading - Refined Product Calculations.)
808,865 at VCUM2 (crude loading) (See Marine Loading - Crude Oil Calculations.)
1,897,017 at VCURR (gasoline loading) (See Rail Loading - Refined Product Calculations.)

Conversion from Petroleum Vapor Combusted in lbs to MMSCF (as Natural Gas Equivalent):

MMSCF (as Natural Gas) = Petroleum Vapor Combusted (lbs) * (21,000 BTUs / lb gasoline (high avg. for C4-C8 gases)(/ (1000 BTU/SCF) / (1,000,000)
MMSCF (as Natural Gas) combusted at VCUML = 74
MMSCF (as Natural Gas) combusted at VCUM2 = 17
MMSCF (as Natural Gas) combusted at VCURR = 40

Marine VCU Emissions from Gasoline & Ethanol Loading (Emission Unit VCUML):

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC*	CH4	N2O	CO	CO2	GHG
Emission Factor - lbs / MM SCF**	7.60	7.60	197.47	150.00	NA	2.30	2.20	84.00	120,000.00	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	560.20	560.20	14,555.66	11,056.50	NA	169.53	162.16	6,191.64	8,845,200.00	8,902,251.54
tons/yr	0.28	0.28	7.28	5.53	NA	0.08	0.08	3.10	4,422.60	4,451.13

Marine VCU Emissions from Crude Oil Loading (Emission Unit VCUM2):

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC*	CH4	N2O	CO	CO2	GHG
Emission Factor - lbs / MM SCF**	7.60	7.60	197.47	150.00	NA	2.30	2.20	84.00	120,000.00	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	129.09	129.09	3,354.29	2,547.92	NA	39.07	37.37	1,426.84	2,038,339.24	2,051,486.53
tons/yr	0.06	0.06	1.68	1.27	NA	0.02	0.02	0.71	1,019.17	1,025.74

Rail VCU Emissions from Gasoline & Ethanol Loading (Emission Unit VCURR):

	Combustion Emissions									
Pollutant	PM 2.5	PM10	SOx	NOx	VOC*	CH4	N2O	CO	CO2	GHG
Emission Factor - lbs / MM SCF**	7.60	7.60	197.47	150.00	NA	2.30	2.20	84.00	120,000.00	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	302.76	302.76	7,866.76	5,975.60	NA	91.63	87.64	3,346.34	4,780,482.47	4,811,316.58
tons/yr	0.15	0.15	3.93	2.99	NA	0.05	0.04	1.67	2,390.24	2,405.66

* These emissions are from gasoline and crude oil vapor combustion and pilot light gas. Gasoline and crude oil VOCs are already accounted for in the VCU emissions (i.e. 2 mg/l loaded or 98% efficiency).
** PM Emission Factor is from AP-42 (Table 1.4-2), as it is higher than the Emission Factor from the VCU manufacturer of zero (0). SOx Emission Factor is calculated as described below. NOx Emission Factor is from VCU manufacturer, as it is higher than the AP-42 Emission factor of 140 lbs/MMSCF (Table 1.4-1). CO Emission Factors is identical from VCU manufacturer and AP-42 (Table 1.4-1). CO2 Emission Factor is from AP-42 (Table 1.402).
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation of SOx Emission Factor:

SOx Emission Factor = y_{H2S} * (1/C) * M_{SO2} * MW_{SO2} (Equation from EPA Emission Inventory Improvement Program (EIIP) Document Volume 3, Ch.10: Preferred & Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production & Procesing Operations, Sept. 1999, Pg 10.2-16.)

$y_{H2S,\ crude\ oil}$ = 0.001 (mole fraction of H2S in inlet gas (lb mole H2S/ lb mole) based on 10 ppm H2S liquid concentration)
C = 379.00 (molar volume of ideal gas at 60F and 1atm (scf/lb-mole))
M = 0.99 (molar conversion ratio from H2S to SO2 (lb-mole SO2/lb-mole H2S) (From VCU Manufacturer))
MW = 64.066 (molecular weight of SO2 (lb SO2/lb-mole SO2))

$EF_{SOX,crude\ oil}$ = 197.47 lb/ MMSCF

Total of Combustion Sources

Pollutant	PM 2.5	PM10	SOx	NOx	VOC	CH4	N2O	CO	CO2	GHG
lb/yr	5,612.06	5,612.06	26,141.49	80,365.85	3,342.69	1,698.16	1,624.36	62,017.94	88,606,002.24	89,177,477.30
tons/yr	2.81	2.81	13.07	40.18	1.67	0.85	0.81	31.01	44,303.00	44,588.74

Emergency Generators (Exempt) Updated with Part 496 emission factors

Emergency Generator Sources:

Fuel Type	Source	Gal/hr (Liquid)	SCF/hr (Gas)	Gal/hr (Gas)	MMBTU/hr*
Propane	QT100 Generator	13.9			1.26
Propane	QT100 Generator	13.9			1.26
Natural Gas	20kw NG Generator		1,020		1.02
Diesel	500kw	26.1			
Diesel	350kw	18.5			
Diesel	350kw	18.5			

*Generac Spec Sheet states, "For BTU content multiply gal/hr x 90950 (LP) or ft3/hr x 1000 (NG)."

Distillate Fired Engine Emissions:

	Pollutant									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Factor - lb/1000 gal*	2.00	2.00	0.21	20.00	0.20	5.00	0.22	0.26	2.2E+04	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	63.10	63.10	6.72	631.00	6.31	157.75	6.81	8.20	703,565.00	706,303.04
tons/yr	0.03	0.03	0.00	0.32	0.00	0.08	0.00	0.00	351.78	353.15

* Emission factors used to estimate emissions are from AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I. SOx, Nox, CO, and PM Emission Factors are from Table 1.3-1. VOC Emission Factor is from Table 1.3-3. CO2 Emission Factor is from Table 1.3-12.
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example calculation:
= gal/yr / 1000 gal * emission factor

Natural Gas & Propane Fired Engine Emissions:

	lbs Pollutant / MM BTU									
Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG**
Factor* - lb/MMBtu	0.0099	0.0099	0.0006	2.270	0.0296	3.720	0.230	0.2	110.0	(CH4*84)+(N2O*264)+(CO2*1)
lb/yr	17.58	17.58	1.04	4,027.45	52.52	6,600.04	408.07	408.07	195,162.55	337,169.92
tons/yr	0.01	0.01	0.00	2.01	0.03	3.30	0.20	0.20	97.58	168.58

* Emission factors used to estimate emissions are from AP-42 Table 3.2-3. No emission factor was available for N2O so the CH4 emission factor was used.
** GHG Emission calculated by using the CO2 Equivalency Factor for CO2 (1), CH4 (84), and N2O (264)

Example Calculation of Natural Gas Usage
= Natural Gas Used 1,774 MMBTU/yr Assumes 500 hours/yr
= Natural Gas Used * Emission factor

Total of Generator Sources

Pollutant	PM2.5	PM10	SOx	NOx	VOC	CO	CH4	N2O	CO2	GHG
lb/yr	80.68	80.68	7.76	4,658.45	58.83	6,757.79	414.88	416.27	898,727.55	1,043,472.95
tons/yr	0.04	0.04	0.00	2.33	0.03	3.38	0.21	0.21	449.36	521.74

	GHG Emission Rate (g/mmbtu)*			
Fuel Type	**CO2**	**CH4**	**N2O**	**CO2e (20 yr GWP)+**
Natural Gas	11,913	384	0.136	44,205

* Emission Rate from NYSDEC guidance document

Natural Gas Used for Boilers*

469,536 mmbtu/yr

* See Combustion calculations - sum of maximum potential natural gas usage

Upstream Emissions (lb/yr)	**CO2**	**CH4**	**N2O**	**CO2e (20 yr GWP)+**
Natural Gas	5,593,582,368	180,301,824	63,857	20,755,838,880

Upstream Emissions (tons/yr)	**CO2**	**CH4**	**N2O**	**CO2e (20 yr GWP)+**
Natural Gas	6,165.77	198.75	0.07	22,879.01

ATTACHMENT D
Greenhouse Gas Offset Calculations

ATTACHMENT D

Calculation of Amount of Biodiesel to offset greenhouse gas emissions

Target to offset: 56,941.01 tons CO2e = 113,882,028 lb CO2e

	TPY CO2e
Total baseline emissions:	18,414.11
60% of baseline (40% reduction):	11,048.47
Post project total facility emissions:	45,110.48
Upstream increase	22,879.00
Increase to offset (new total-60% of baseline+upstream):	56,941.01

Lifecycle Greenhouse Gas Emissions for Distillate:

97 kg CO2e/ mmBTU Source: https://www.epa.gov/fuels-registration-reporting-and-compliance-help/lifecycle-greenhouse-gas-results
140000 BTU/ gallon of distillate Source: https://www3.epa.gov/ttn/chief/ap42/appendix/appa.pdf

13.58 kg CO2e/ gallon of distillate
29.876 lb CO2e/ gallon of distillate

Lifecycle Greenhouse Gas Emissions for Biodiesel:

Assume 20% credit ("renewable fuel") :

23.9008 lb CO2e/ gallon of biodiesel*
*(lb CO2e/gallon of distillate x 80%)

Difference in CO2e per gallon between distillate and biodiesel: 5.9752 lb CO2e/ gallon*
*(29.876 lb CO2e/gallon of distillate - 23.9008 lb CO2e/gallon of biodiesel)

Gallons of Biodiesel to offset target CO2e emissions:

19,059,115.68 gallons of biodiesel*
*(113,882,028 lb CO2e target to offset / 5.9752 lb CO2e difference in CO2e per gallon between distillate and biodiesel)

Example comparison to illustrate the offset:

Scenario 1 - Diesel Only Emissions, No Biodiesel

100,000,000	gallons diesel assumed for example	
2,987,600,000	lb CO2e	(100000000 gallons * 29.876 lb CO2e/gallon distillate)
1,493,800	tons CO2e	

Scenario 2 - With Biodiesel Offset

80,940,884	gallons distillate	(gals diesel assumed for example - gals biodiesel to offset increase in CO2e)
19,059,116	gallons biodiesel needed to offset increase in CO2e	
2,873,717,972	lb CO2e total	(29.876 * 80,940,884 + 23.9008 * 19,059,116)
1,436,859	tons CO2e	(lb/2000)

Attachment X

PPP

ALBANY TERMINAL

Public Participation Plan

June 1, 2020

Albany Terminal
Public Participation Plan
Table of Contents

Albany Terminal
Public Participation Plan

1. Purpose of this Document

Global Companies LLC is proposing changes to its petroleum terminal in Albany's South End neighborhood (the "Terminal"). These changes will be detailed in a proposed air permit renewal modification application that Global will submit to the New York State Department of Environmental Conservation (NYSDEC).

The purpose of this document is to outline a program for ensuring that members of the community receive information about the proposed changes and are provided opportunities to participate in the NYSDEC's review of those changes under New York's Title V air permitting program. In this plan, "community" refers to residents/neighborhood groups who are near or adjacent to the Terminal (a community generally known as the South End). Additional stakeholders are identified in Section 8 below.

2. Background

Global's Albany Terminal is located at 50 Church Street in the City of Albany. The Albany Terminal is a bulk petroleum storage and transfer facility adjacent to the Port of Albany along the Hudson River. The Terminal consists of aboveground petroleum storage tanks as well as truck, rail and marine loading facilities. Global has owned the Terminal since 2007. The facility was established at its current location in the 1920s.

The Albany Terminal is served by the Canadian Pacific (CP) railroad. CP owns and operates the Kenwood Yard where rail cars serving Global and the Port of Albany enter and leave.

A map showing the location of the Albany Terminal and its key components is included in Appendix A.

Global's Albany Terminal receives, stores and distributes petroleum and related products to customers in the Capital District and beyond and is a critical piece of the Northeast's energy infrastructure. Global handles a wide variety of products at the Terminal, including gasoline, diesel fuel, home heating oil, kerosene, crude oil and renewable fuels such as ethanol and biodiesel.

Products are delivered to the Terminal by barge and rail, and transferred into one of the various tanks at the facility. The products are then pumped from the tanks into trucks, rail cars or ships/barges for delivery to customers.

3. Proposed Operational Changes

Global's Albany Terminal operates under a Title V air permit from the NYSDEC. In March 2020, Global plans to submit a permit renewal modification application to the NYSDEC. It will include some changes that have been influenced by previous community input.

Key changes in the renewal modification application would:

- decrease the amount of crude oil allowed to be shipped through the Terminal by over 75%, a reduction of 1.4 billion gallons;
- increase Global's capabilities to handle biodiesel at the Terminal to help meet New York's renewable energy requirements and greenhouse gas reduction initiatives;
    - Natural gas-fired boilers would be installed to receive, store, and ship biodiesel, a renewable fuel. No other products will be heated;
    - The proposal specifically prohibits the use of boilers to heat crude oil;
- install enhanced controls to more effectively treat emissions from loading operations;
- add flexibility to respond to changes in the market and improve service to our customers by eliminating product-specific throughput caps and subjecting refined products to a single facility-wide cap that allows Global to switch products among loading racks.
- add more positions at the truck loading rack to reduce customer wait time and truck idling time; and,
- add more positions at the rail loading rack to improve efficiency and reduce locomotive use when loading trains.

4. Public Participation Goals

The goals of this public participation plan are to:

- Establish avenues for members of the South End community and other stakeholders to learn about the planned changes at the Terminal and provide input.
- Create opportunities that foster open and effective dialogue with stakeholders.
- Build relationships with community members and other stakeholders.
- Provide forums to hear and respond to concerns.
- Identify any actions that minimize impacts on the community and the environment.

Global is committed to being an active and engaged member of the community.

- Global employees, including executives, have begun meeting with community leaders and neighbors on a regular basis.
- Global maintains a website on the Albany Terminal, https://globalalbany.com/, to provide information to the community. The site will be updated as part of this public participation effort.

- In August 2019, Global hired a full-time community liaison for the company with more than 35 years of community involvement experience in Albany.
- Global also supports K-12 education and recreation programs, community organizations, and public safety programs in Albany.

Examples of past public participation efforts and community support are included in Appendix B.

5. Regulatory Review Process

Global's Albany Terminal is currently subject to a Title V air permit issued by the NYSDEC under 6 NYCRR Part 201. Operations at the Terminal must comply with the conditions outlined in the permit.

The proposed changes at the Terminal require Global to modify its existing Title V permit. The NYSDEC will review the application and conduct a public review process in accordance with the procedures and standards established by NYSDEC under 6 NYCRR Part 201 (air permitting) and Part 621 (uniform permitting procedures).

In addition to the proposed permit renewal modification application, Global will also prepare an Environmental Assessment Form (EAF) required under the State Environmental Quality Review Act (SEQRA), 6 NYCRR Part 617. The EAF will assess whether there are potential significant environmental impacts relating to the proposed changes, including, but not limited to, noise, truck traffic, visual impacts, odors, and greenhouse gas emissions, including the implications of the recently enacted Climate Leadership and Community Protection Act. NYSDEC will review the EAF at the same time it reviews the Title V air permit renewal modification. Notice of the proposed Title V air permit modification will be published in the NYSDEC's Environmental Notice Bulletin as well as in a local newspaper(s). A minimum 30-day public notice and comment period will be provided. Copies of the application, including the EAF, will be made available at the document repositories identified in Section 9 below.

6. Public Participation Process

To continue its ongoing efforts to involve the community and to ensure the community is informed about the proposed changes to the Global Terminal and has ample opportunity to provide input, Global will implement this Public Participation Plan.

The key steps Global has taken or will take under the Plan are:

- identifying community members and other stakeholders;
- identifying community concerns;
- developing and distributing written information about the proposed changes and the review process;
- establishing a Community Liaison representative;
- opening an Albany Community Outreach Office and maintaining open office hours;

- meeting with neighborhood residents and tenants association members on a regular basis;
- providing updates to elected officials (City and County of Albany, State of New York) on a regular basis;
- holding a public information meeting or meetings to keep the public informed about the proposed changes and the review process;
- including event updates in Albany Housing Authority's monthly mailings;
- establishing easily accessible document repositories in the adjoining neighborhood(s);
- maintaining an updated website; and
- reporting periodically on progress toward implementing this plan, including certifying final compliance.

In light of COVID-19 and restrictions on public meetings, Global has put together a Virtual Engagement Plan, which can be found in Appendix D. This plan will replace the public meeting. As needed, we will continue to update the PPP and the Virtual Engagement Plan.

7. Identifying Stakeholders

Stakeholders include community members — residents/neighborhood groups who are near or adjacent to the Terminal — as well as others who have a potential stake in the proposed operational changes. This includes people who have expressed an interest in the proposed changes by attending public meetings, writing or calling; neighborhood religious establishments and other organizations; and elected officials who live in and/or represent the community of concern.

A list of stakeholders, with available contact information, is included in Appendix C. The portion of the list containing the names of individual residents has been omitted to preserve their privacy. The stakeholder list includes:

- **Residents and neighborhood groups near the Terminal**
  - Ezra Prentice Homes Tenants Association
  - Residents of Steamboat Square
  - Residents of the Mount Hope neighborhood and the South End generally
  - South End Neighborhood Association

- **Community, civic, environmental and business leaders and organizations**
  - Executive Director, Avillage
  - Dominick Casolaro, former Albany Common Council representative, Ward 1
  - Alice Green, Executive Director, Center for Law & Justice
  - Steve Longo, Executive Director, Albany Housing Authority
  - Sergeant (Ret.) Leonard Ricchiuti, Police Athletic League
  - Tim Doherty, Director of Operations, Boys and Girls Club of the Capital Area
  - Scott C. Jarzombek, Executive Director, Albany Public Library
  - Kevin Mitchell, President, Just Be Ready, Street Outreach Org.
  - Joanne Morton, President, South End Neighborhood Association

- Center for the Disabled
- Capital City Rescue Mission
- Salvation Army

- **Schools and religious organizations**
  - Marc Johnson, Pastor, St. John's Church of God in Christ
  - Jasmine Brown, Principal, Giffen Memorial Elementary School
  - Amanda Boyd, Teacher, Giffen Memorial Elementary School
  - Mt. Calvary Baptist Church
  - The Parish of St. John the Evangelist and St. Joseph

- **Government and elected officials**

  City of Albany
  - Kathy M. Sheehan, Mayor of Albany
  - Corey Ellis, President, Albany Common Council
  - Sonia Frederick, Albany Common Council, Ward 1
  - Derek Johnson, Albany Common Council, Ward 2
  - Kelly Kimbrough, Albany Common Council, Ward 4, President Pro Tempore
  - Joseph Gregory, City of Albany Fire Chief
  - Eric Hawkins, City of Albany Police Chief
  - Dorcey Applyrs, Chief City Auditor

  Port of Albany
  - Georgette Steffens, Commission Chairperson, Albany Port District
  - Rich Hendrick, General Manager, Port of Albany

  Albany County
  - Dan McCoy, Albany County Executive
  - George Penn, Director of Operations, Albany County
  - Elizabeth F. Whalen, Department of Health Commissioner
  - Craig Apple, Albany County Sheriff
  - Andrew Joyce, Chairman, Albany County Legislature
  - Carolyn McLaughlin, Albany County Legislature, District 1
  - Samuel Fein, Albany County Legislature, District 6

  State of New York
  - Senator Neil Breslin
  - Assembly Member John McDonald
  - Assembly Member Patricia Fahy
  - Congressman Paul Tonko
  - Basil Seggos, Commissioner, NYSDEC
  - Tom Berkman, General Counsel, NYSDEC
  - Rosa Mendez, Director, Office of Environmental Justice, NYSDEC

- Keith Goertz, Regional Director, Region 4, NYSDEC
- Nancy Baker, Regional Permit Administrator, Region 4, NYSDEC
- Jordan Gougler, Office of Environmental Justice

Global will add to the stakeholder list throughout the public participation and permit review process. Persons and organizations that include contact information on the sign-in sheet for the public meeting(s) or fill in the request for information form on Global's Project website will be added to the stakeholder list.

8. Communicating with Community Members and Other Stakeholders

Global will encourage public participation through the following activities:

a. Community Outreach

Global has hired a full-time Community Liaison representative to encourage and facilitate communication with community members and other stakeholders. The Community Liaison will lead or support the following efforts:

- Global is establishing an Albany Community Outreach Office in the community. The Outreach Office is one of several channels, along with other activities described in this plan, where community members and stakeholders may share concerns with Global, ask questions, and receive information.

- The Community Outreach Office will be open to the public on the following schedule:
    - Tuesday, 11:00 am - 2:00 pm.
    - Wednesday, 11:00 am - 2:00 pm. and 5:30 pm to 8:30 pm
    - Thursday, 11:00 am - 2:00 pm.
    - Other times by appointment

- The Community Liaison representative will hold regular meetings with community members and tenants association members as desired by the community.

- The liaison will attend monthly Neighborhood Association meetings and activities, and will hold monthly planning meetings with community partners.

- Global will update elected officials (city, county and state) on a regular basis to share information and answer questions so that their constituencies have an open and ongoing communication channel.

b. Open House

Prior to submitting the permit renewal modification application, Global will hold an open house in the Ezra Prentice Community Room. The open house is scheduled for February 25, 2020. The open house will provide an informal opportunity for community members to learn about the Project and the proposed changes. The open house location is accessible for individuals with disabilities.

Notice of the open house was mailed or emailed to homes and apartments within the marked area identified in Figure 1, as well as the organizational and government stakeholders identified above. Flyers were posted in the community, including the Ezra Prentice community room. Notice of the meeting was also posted on the Project website. The notice to the community and identified stakeholders provided at least three weeks' notice of the event.

The notice includes a short description of why the public should attend, how they can participate, and contact information for any questions about the open house. A fact sheet about the Project is included in the notice. We have reviewed languages spoken in the area and have concluded that no outreach in a language other than English is necessary.

Figure 1: Direct mail notification area.

The location, date and time of the open house was set after consulting with community leaders, elected officials and other stakeholders.

Individuals who attend the open house and provide contact information on the sign-in sheet will be added to the stakeholder list and will receive further notices concerning the Project.

The direct mail with Notice of the Open House and Fact Sheet went out to 2,724 total addresses, including:

- 2,686 residential addresses including multi-family housing units, apartments, and houses in the vicinity of the terminal (see map 1B, letter distribution map).
- 38 from the Stakeholders List that are geographically outside of the letter distribution map area.
- Global will continue to add to the Stakeholder List and send all direct mail to this list moving forward.

c. Public Meeting

In addition to the open house, a public meeting will also be held within the first 30-60 days after the proposed permit renewal is submitted to the NYSDEC. The public meeting is an opportunity for members of the public to comment on the proposed air permit modification and to ask questions of Global. This meeting location will be accessible for individuals with disabilities.

The location, date and time of the public meeting will be set after consulting with community leaders, elected officials and other stakeholders.

A letter to the community and identified stakeholders will provide at least three weeks' notice of the meeting. Flyers will be posted in the community, including the Ezra Prentice community room. Notice of the meeting will also be posted on the Project website

Additional status/update meetings will be added as necessary to ensure the community and stakeholders are informed of any changes or new developments.

Based on the extent of public interest, NYSDEC may decide to conduct a formal hearing under 6 NYCRR Part 621 in addition to or in lieu of the public meeting once the modified Title V permit has been drafted and notice of the application has been published in the Environmental Notice Bulletin and in a local newspaper(s).

Please see Appendix D for our Virtual Engagement Plan.

d. Other Notifications

Global sent a letter to residents living near the Albany Terminal in June 2018 informing stakeholders that a permit modification application would be submitted. The letter was sent to homes and apartments in a roughly one-mile radius around the Terminal. See Appendix B for a copy of the letter and a map of the distribution area.

As previously noted, a notice to the community informing residents about the February 2020 open house was mailed in early February 2020. A similar letter will be mailed to residents before the public meeting.

In addition, notice of the proposed Title V air permit renewal modification will be published in the NYSDEC's Environmental Notice Bulletin and a local newspaper as required by 6 NYCRR Part 621.

e. Print Materials

Global has prepared a one-page, easy-to-read fact sheet describing the Project and proposed changes. The fact sheet was distributed to stakeholders in the notice announcing the open house and will be included in the notice for the public meeting. It will be posted on the Project website and included in the document repositories. The open house invitation and fact sheet is included in Appendix C.

f. Updated Website

Global will continue to update the Terminal website, https://globalalbany.com/ to ensure it contains up-to-date information about the Project. The website will describe existing operations and the proposed changes, provide information about the Title V air permit review process, and offer regular status updates. Global anticipates that the website will include:

- Facility description
- Project description
- Summary of permitting requirements
- Links to key documents
- Facility contact information, including instructions on how to be added to the stakeholder list
- Address and hours of the Albany Community Outreach Office
- Addresses of local document repositories
- Dates/times/locations of public outreach events and key milestone dates

The site will be updated regularly before and during the permit review process.

g. Timing

Open House Notice/Fact Sheet	February 4
Open House	February 25
Public Meeting Notice*	April/May TBD
Public Meeting*	Spring TBD

**Expected date, subject to confirmation.*

A timetable for additional activities will be developed and shared with NYSDEC and the community as the Project proceeds.

9. Access to Information

All official reports and documents related to the permit modification application will be available for review in the following places.

- **The Albany Housing Authority**
  200 South Pearl Street
  Albany, NY 12202
  (518) 445-0744
  www.albanyhousing.org

- **Albany Public Library**
  John A. Howe Branch
  105 Schuyler Street (intersection of Schuyler & Broad Streets)
  Albany, NY 12202
  (518) 472-9485
  www.albanypubliclibrary.org/locations/howe/

- **The Global Albany Terminal website**
  https://globalalbany.com/

- **Albany Community Outreach Office**
  As previously noted, Global is in the process of establishing a Community Outreach Office. Key documents will be available at the office once it has been opened.

10. Progress Report

A progress report will be prepared updating this plan. The update will:
- outline substantive concerns raised and how they were resolved;
- identify any outstanding issues;
- identify components of the plan yet to be implemented; and
- propose an expected timeline for completion of the plan.

The update will be issued after the first public meeting.

An additional progress report may be prepared if there is extensive public comment concerning the Project, resulting in an expanded public comment period.

11. Final Public Participation Plan Report

A final report will be provided at the conclusion of the permit process documenting the public participation process for this permit modification application.

Appendix A
Albany Terminal Map

Appendix B
Past Public Outreach Efforts

Global is committed to working with community members and stakeholders to ensure everyone's voice is heard. Notable government and community outreach efforts undertaken in recent years include the following:

- In June 2018, Global sent a letter to community members updating them on the permit modification status. The letter was mailed to all residential addresses in a roughly one-mile radius round the Terminal, as shown in Figure 1B. A copy of the letter follows below.

- In November 2019, Global conducted a tour of the Terminal for local political leaders and others to familiarize them with Terminal operations. More generally, in recent years, Global representatives have met on multiple occasions with political and community leaders.

- Global supports K-12 education and recreation programs, community organizations, and public safety programs in Albany.

- Global donates home heating oil to help families in need.

- Local giving includes:
  - Albany Police Athletic League
  - Albany Boys and Girls Club
  - Albany Department of Recreation
  - Capital District Black Chamber of Commerce
  - Christ Church of Albany
  - 4th Family – STEM Through Sports Program
  - Giffen Elementary School
  - Lark Street Business Improvement District, (including *Movies Under the Stars* sponsorship)
  - Madison Avenue Fire Relief Fund
  - TruHeart Holiday Dinner
  - WAGE Center at the Albany Housing Authority

GLOBAL ALBANY

June 13, 2018

Dear Neighbor,

Over the past few months, you may have heard a little about Global Partners. But, so far, you haven't heard directly *from* Global Partners. So we'd like to introduce ourselves and tell you a little about what we do.

Essentially, we're in the energy delivery business. Every day, people fill their tanks, heat their homes and operate their businesses with the products we deliver.

In 2007, we purchased our terminal near the Port of Albany from ExxonMobil. Since then, we've invested more than $30 million upgrading the facility – making it safer, and more efficient.

We're one of about two dozen industries that operate near or at the port. The property we own has been a petroleum terminal for a century. Our goal is to operate it in a safe, environmentally sound manner while delivering the energy that people rely on.

Later this year, we plan to propose some changes at the terminal – based in part on what we've heard from you and your neighbors. Our proposal will call for reducing the amount of crude oil at the Global terminal. And there will be no heaters for that crude oil.

As we propose these changes, we'll stay in touch. Meanwhile, if you have questions, please let us know at albanyinfo@globalp.com

Thanks,

Chuck Furman
Terminal Manager

GLOBAL AT A GLANCE

- Global began more than 75 years ago delivering home heating oil with a single truck. We made a simple promise to all our customers: Reliability. No matter the weather or the circumstances, they could count on us to deliver the fuel they needed and to keep our word.
- We're a third-generation, family-run company.
- We employ 30 people at our Albany terminal, and approximately 250 people in the greater Albany region.
- We're one of the largest wholesalers of Mobil gasoline in the region.
- Every day, around 700,000 people fill their tanks with gasoline we deliver.
- Our mission is to be the safest and most reliable provider of the energy people use to heat their homes, take their kids to school or operate their businesses.

For more information, visit globalalbany.com

Global Albany 50 Church Street / Albany, NY 12202 / globalalbany.com

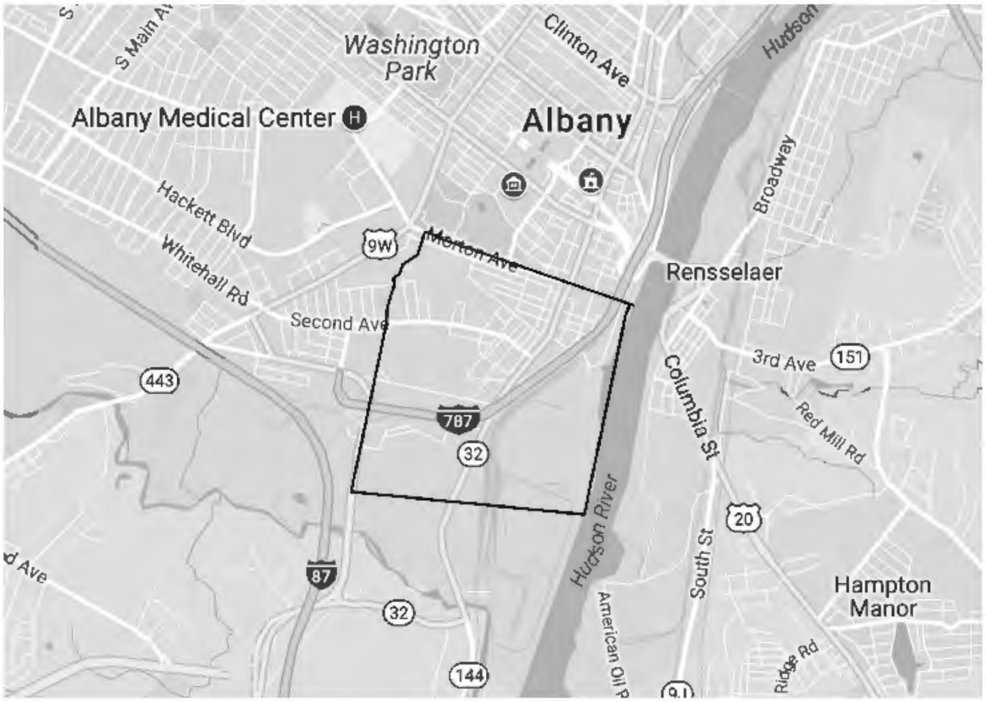


Figure 1B. Letter Distribution Map

The direct mail with Notice of the Open House and Fact Sheet went out to 2,724 total addresses, including:

- 2,686 residential addresses including multi-family housing units, apartments, and houses in the vicinity of the terminal (see map 1B, letter distribution map) .
- 38 from the Stakeholders List that are geographically outside of the letter distribution map area.
- Global will continue to add to the Stakeholder List and send all direct mail to this list moving forward.

Appendix C
Open House Invitation/Fact Sheet, Flyer, and Public Stakeholder List

See following pages.

OPEN HOUSE INVITATION/FACT SHEET

GLOBAL ALBANY

50 Church Street
Albany, NY 12202

PLEASE JOIN US **February 25, 6:00 pm**
Global Partners Open House

You are invited to an Open House.

Global Partners is moving ahead with the process of renewing our air permit for our Albany Terminal. As part of this effort, we are proposing some changes to the terminal that respond to previous community input.

Read more inside, and come to the Global Partners Open House to learn more.

PLEASE JOIN US

WHAT
An Open House on the Albany Terminal Air Permit

WHEN
Tuesday, February 25
6:00pm – 8:00pm

WHERE
Ezra Prentice Homes
Community Room
625 South Pearl Street
Albany, NY 12202

Every day, people count on Global Partners to supply the gas for their cars and trucks, the heat for their homes, and the energy that powers businesses.

Being a good neighbor is part of the responsibility that comes with running a facility like our Albany Terminal. We're committed to working with community members and stakeholders, elected officials, and regulatory agencies to ensure everyone's voice is heard.

Dear Neighbor,

Global Partners is moving ahead with the process of renewing our air permit for our Albany Terminal. As part of the permit renewal modification, we are proposing some changes in the way the terminal is operated.

These changes have been influenced by what we have heard from the community previously. They include a proposed decrease of more than 75% in the amount of crude oil allowed to be shipped through the terminal. The proposed changes are summarized in this brochure.

A permit renewal modification will be submitted to the New York State Department of Environmental Conservation (NYSDEC) in March. However, the public process with opportunities for further input begins now.

We are hosting an Open House on February 25 so you can learn more, ask questions, and share your views. We hope to see you there.

Dylan Remley
Senior Vice President of Terminal Operations

What changes are being proposed?

Global's Albany Terminal operates under a Title V air permit from the New York State Department of Environmental Conservation. In March, Global plans to submit a permit renewal modification to the NYSDEC. It will include some voluntary changes that have been influenced by previous community input.

Key changes include:

- Decreasing the allowable amount of crude oil to be shipped through the terminal by over 75%.
- Installing enhanced controls to more effectively treat emissions from our loading operations.
- Expanding the types of biofuels handled at the terminal to help meet New York's renewable energy requirements and greenhouse gas reduction initiatives.
- Installing natural-gas fired boilers needed to receive, store, and ship certain biofuels. No other products will be heated.
- Adding flexibility to respond to changes in the market and improve service to our customers.

About the Albany Terminal

Global Albany is a hub for the safe delivery, storage, and distribution of energy products. The terminal helps fuel homes, vehicles, and the local economy.

- The terminal handles a variety of products, including gasoline, diesel fuel, home heating oil, kerosene, and renewable fuels such as ethanol and bio-based diesel.
- Global purchased the Albany Terminal from ExxonMobil in 2007. Since then, we've invested more than $30 million in upgrades.
- Since 2013, the Albany Terminal has undergone more than 400 inspections by state and federal agencies with no major findings.

As a third-generation, family-run company, Global Partners is committed to working safely and reliably with communities and regulators everywhere we do business.

PLEASE JOIN US

Global Partners Open House

WHEN
Tuesday, February 25
6:00pm – 8:00pm

WHERE
Ezra Prentice Homes
Community Room
625 South Pearl Street
Albany, NY 12202

FOR MORE INFORMATION Please visit **globalalbany.com**

OR CONTACT OUR COMMUNITY OUTREACH OFFICE
Mark Bobb-Semple
Community Liaison
mark.bobb-semple@globalp.com
(518) 775-7093

OPEN HOUSE FLYER

GLOBAL ALBANY

You are invited to an open house.

PLEASE JOIN US

WHAT
An Open House on the Albany Terminal Air Permit

WHEN
Tuesday, February 25
6:00pm – 8:00pm

WHERE
Ezra Prentice Homes
Community Room
625 South Pearl Street
Albany, NY 12202

COME TO THE OPEN HOUSE TO LEARN MORE

Global Partners is moving ahead with the process of renewing our air permit for our Albany Terminal. As part of this effort, we are proposing some changes to the terminal that respond to previous community input.

FOR MORE INFORMATION

CONTACT OUR COMMUNITY OUTREACH OFFICE
Mark Bobb-Semple | Community Liaison | mark.bobb-semple@globalp.com | (518) 775-7093
OR VISIT globalalbany.com

OPEN HOUSE FLYER

GLOBAL ALBANY

Open house on the Albany Terminal air permit

What changes are being proposed?

Global's Albany Terminal operates under a Title V air permit from the New York State Department of Environmental Conservation (NYSDEC). In March, Global plans to submit a permit renewal modification to the NYSDEC. It will include some voluntary changes that have been influenced by previous community input.

Key changes include:

- Decreasing the allowable amount of crude oil to be shipped through the terminal by over 75%.
- Installing enhanced controls to more effectively treat emissions from our loading operations.
- Expanding the types of biofuels handled at the terminal to help meet New York's renewable energy requirements and greenhouse gas reduction initiatives.
- Installing natural gas-fired boilers needed to receive, store, and ship certain biofuels. No other products will be heated.
- Adding flexibility to respond to changes in the market and improve service to our customers.

We are hosting an open house on February 25 so you can learn more, ask questions, and share your views. We hope to see you there.

PUBLIC STAKEHOLDER LIST

20-Mar-20

Category	First Name	Last Name	Title	Business	Address1	Address2	City	State	Zip	Email
Civic+Envir+Business leaders	Dominick	Calsolaro					Albany	NY		
Civic+Envir+Business leaders	Tim	Doherty	Director of Operations	Boys and Girls Club of the Capital Area	21 Delaware Ave		Albany	NY	12210	
Civic+Envir+Business leaders	Alice	Green	Executive Director	Center for Law & Justice	220 Green Street		Albany	NY	12202	
Civic+Envir+Business leaders	Scott C.	Jarzombek	Executive Director	Albany Public Library	161 Washington Ave		Albany	NY	12210	
Civic+Envir+Business leaders	Perry	Jones	Executive Director	Capital City Rescue Mission	259 S. Pearl Street		Albany	NY	12202	
Civic+Envir+Business leaders	Steve	Longo	Executive Director	Albany Housing Authority	200 South Pearl Street		Albany	NY	12202	
Civic+Envir+Business leaders	Kevin	Mitchell	President	Just Be Ready, Street Outreach Org.						
Civic+Envir+Business leaders	Joanne	Morton	President	South End Neighborhood Association						
Civic+Envir+Business leaders	Sergeant (Ret.) Leonard	Ricchiuti		Police Athletic League	844 Madison Avenue		Albany	NY	12208	
Civic+Envir+Business leaders	Gregory	Sorrentino	President/CEO	Center for Disability Services	314 South Manning Blvd		Albany	NY	12208	
Civic+Envir+Business leaders	Executive Director			Avillage	3 Lincoln Square		Albany	NY	12202	
Civic+Envir+Business leaders				Salvation Army of Albany New York	20 South Ferry St.		Albany	NY	12202	
Gov't	Craig	Apple	Albany County Sheriff		16 Eagle Street		Albany	NY	12207	
Gov't	Dorcey	Applyrs	Chief City Auditor	City Hall	24 Eagle Street		Albany	NY	12207	
Gov't	Nancy	Baker	Regional Permit Administrator, Region 4	NYSDEC	1130 North Westcott Rd		Schenectady	NY	12306	
Gov't	Tom	Berkman	General Counsel	NYSDEC	625 Broadway		Albany	NY	12233-0001	
Gov't	Senator Neil	Breslin		Capitol Building	172 State Street	Room 430C	Albany	NY	12247	
Gov't	Corey	Ellis	President	Albany Common Council	24 Eagle Street	Room 202	Albany	NY	12207	
Gov't	Assembly Member Patricia	Fahy			198 State Street	LOB 452	Albany	NY	12248	
Gov't	Samuel	Fein		Albany County Legislature, District 6	5 Elm Street		Albany	NY	12202	
Gov't	Sonia	Frederick		Albany Common Council, Ward 1	18 Sparkill Ave		Albany	NY	12209	frederick.sonia@gmail.com
Gov't	Keith	Goertz	Regional Director, Region 4	NYSDEC	1130 North Westcott Rd		Schenectady	NY	12306	
Gov't	Jordan	Gougler		NYSDEC Office of Envir	625 Broadway, 14th Floor		Albany	NY	12233	
Gov't	Joseph	Gregory	City of Albany Fire Chief		26 Broad Street		Albany	NY	12202	
Gov't	Eric	Hawkins	City of Albany Police Chief		165 Henry Johnson Blvd		Albany	NY	12210	
Gov't	Richard	Hendrick	CEO	Port of Albany	106 Smith Blvd		Albany	NY	12202	
Gov't	Derek	Johnson		Albany Common Council, Ward 2	69 Trinity Place	Apt. 209	Albany	NY	12202	
Gov't	Andrew	Joyce	Chairman	Albany County Legislature	112 State Street	Room 710	Albany	NY	12207	
Gov't	Kelly	Kimbrough	President Pro Tempore	Albany Common Council, Ward 4	80 Van Rensselaer Blvd		Albany	NY	12204	
Gov't	Dan	McCoy	Albany County Executive		112 State Street	Room 1200	Albany	NY	12207	
Gov't	Assembly Member John	McDonald			198 State Street	LOB 417	Albany	NY	12248	
Gov't	Carolyn	McLaughlin		Albany County Legislature, District 1	112 State Street	Room 710	Albany	NY	12207	cmclaughlin2017@gmail.com
Gov't	Rosa	Mendez	Director, Office of Environmental Justice	NYSDEC	625 Broadway		Albany	NY	12233-0001	
Gov't	George	Penn	Director of Operations	Albany County	112 State Street	Room 1200	Albany	NY	12207	
Gov't	Basil	Seggos	Commissioner	NYSDEC	625 Broadway		Albany	NY	12233-0001	
Gov't	Kathy M.	Sheehan	Mayor of Albany		24 Eagle Street	Room 102	Albany	NY	12207	
Gov't	Georgette	Steffens	Commission Chairperson	Albany Port District	106 Smith Blvd		Albany	NY	12202	
Gov't	Congressman Paul	Tonko			19 Dove Street	Ste 302	Albany	NY	12210	
Gov't	Elizabeth F.	Whalen	Commissioner	Albany County Department of Health	175 Green Street		Albany	NY	12202	
Individual	Orville	Abrahams								
Individual	Mary	Alsten					Albany	NY		
Individual	Lawrence	Clark					Albany	NY		
Individual	Susan	Dubois					Albany	NY		
Individual	Portia	Gaddy					Albany	NY		
Individual	Tarea	Giles								
Individual	Anna	MacMartin					Albany	NY		
Individual	Demetrius	Martinez					Albany	NY		
Individual	Judith	Mazza					Albany	NY		
Individual	Tammy	Miller					Albany	NY		
Individual	Kevin	Mitchell					Albany	NY		
Individual	Michael	Saccoman								
Individual	Kevin	Thompson								
Individual	April	Tucker					Albany	NY		

PUBLIC STAKEHOLDER LIST

Individual	James	Tucker					Albany	NY		
Individual	Colleen	Williams					Albany	NY		
Individual	Stephen	Winters					Albany	NY		
Neighbor Groups				Ezra Prentice Homes Tenants Association						
Neighbor Groups				Residents of Steamboat Square						
Neighbor Groups				Residents of the Mount Hope neighborhood and the South End						
Neighbor Groups				South End Neighborhood Association						
Schools + Religious Orgs	Jasmine	Brown	Principal	Giffen Memorial Elementary School	274 S. Pearl Street		Albany	NY	12202	
Schools + Religious Orgs	Marc	Johnson	Pastor	St. John's Church of God in Christ	74 4th Ave.		Albany	NY	12202	
Schools + Religious Orgs				Mount Calvary Baptist Church	58 Alexander Street		Albany	NY	12202	
Schools + Religious Orgs				The Parish of St. John the Evangelist and St Joseph	53 Herrick St		Renssalae r	NY	12144	
Schools + Religious Orgs	Amanda	Boyd		Giffen Memorial Elementary School	274 S. Pearl Street		Albany	NY	12202	

Appendix D
Virtual Engagement Plan

See following pages.

May 1, 2020

Global Albany
Outreach Proposal to the NYDEC
Virtual Engagement Plan

Global hosted an open house on February 25 on its proposed Title V permit modification application for the Albany Terminal and was scheduled to host a public meeting in March after the application was submitted. The purpose of the public meeting is to allow Global's neighbors the opportunity to learn about the proposed changes and ask questions. Due to COVID-19, that meeting cannot happen in person, as initially imagined.

Here are our recommendations on proceeding with outreach to fulfill the intent of the public meeting, and provide the community different ways to learn about the permit and engage with Global.

Global is looking to use a blend of technologies and create a variety of access points so that it is easy for neighbors to participate. We seek to educate and engage the community.

- Make a video that clearly explains the permit and Global's operations in Albany. The video would include sections on these topics:
    - About Global
    - Terminal operations
    - Community outreach
    - Permit: what changes are being proposed?
        - What is biodiesel?
        - Flexibility and throughput caps
    - Permitting process, what to expect, what's next

- Publish the video through the GlobalAlbany.com website, other websites like the Albany Housing Authority, and via email to the stakeholder list. Global's community liaison would also follow up with certain stakeholders to ensure they have received the information.

- Send a direct mail to neighbors and stakeholders (using the existing mailing list). The mailing would inform and invite neighbors to join the virtual public meetings and view the video and other information online. It would also include a postage pre-paid response card soliciting questions from community members. The neighbors and stakeholders that receive the postcard would thus be able to quickly write down a question, and mail their postcard back to Global at no cost. The mailing would include this information:
    - A summary of the application;
    - Directions on how to obtain the application materials on the publicly available website;

  - The time and date of a video- or teleconference meeting, and directions for accessing it;
  - A contact list of telephone numbers and e-mail addresses;
  - Instructions on how impacted residents can submit questions or comments via email, writing or telephone, and the deadline for submitting questions via those alternative methods.
  - The community could also submit questions through the website.

- The virtual meeting information would also be available online through the GlobalAlbany.com website, through other websites like the Albany Housing Authority and via email to the stakeholder list. If feasible under COVID-19 restrictions, we will also post information at these locations. The community could also submit questions through the website.

- Host two virtual public meetings that are accessible by phone and video. Global contemplates hosting two meetings, one in the evening and one midday. The meetings would follow this format:
  - Screening of the video to explain the permit and Global's operations.
  - Additional remarks by subject matter experts at Global and possible community leaders.
  - Q&A section
    - Global would read questions from the submitted postcards and online questions.
    - Global would open the meeting to additional questions.
    - Global's prime objective is to listen to the community at these virtual meetings. When possible, Global will respond to questions.
  - Discussion of status of review process and steps going forward.

- Videos of the meetings would be saved online.

- Pertinent questions and comments will be saved in a separate document that is easily searchable online and will be provided to the NYDEC. All comments received via postcard, email or at the meetings will be documented.

- *Technology:* Global will need to research the best platform to host the virtual public meetings, balancing access and security. For example, attendees that wish to ask a question "live" during the virtual public meetings may need to RSVP in advance to allow Global to keep the meeting secure. However, Global will look for ways to make the video feed live and public during the virtual meeting for all observers.

Suggested Timeline (given in number of weeks per phase, start date will be adjusted accordingly)

3 Weeks

- Finalize virtual outreach with NYDEC
- Global produces video and outreach materials

1-2 Week

- Mail post cards*
- Publish video online
- Outreach to stakeholders

1 Week

- Host two virtual meetings

1 Week

- Publish virtual meetings and Q&A to website

**Three-weeks notice is written into our PPP, please note the NYDEC is requiring 15-days per the below criteria.*

Criteria from NYDEC

1. **Applicants** and **DEC staff** must immediately cancel all public meetings and information sessions.

2. As part of any public participation plans, **applicants** must host one video or teleconference call in place of cancelled public meetings and information sessions.

3. **Applicants** must create a dedicated publicly accessible website to publish all application and related documents.

4. **Applicants** must mail informational flyers to impacted residents 1) with a summary of the application, 2) directions on how to obtain the application materials on the publicly available website, 3) the time and date of a video- or teleconference meeting (that would take place in place of a public meeting), and 4) a contact list of telephone numbers and e-mail addresses. Applicants must provide explicit directions on signing onto the tele- or video conference. The informational flyer should also include instructions on how impacted residents can submit questions or comments via email, writing or telephone, and the deadline for submitting questions via those alternative methods.

5. The video- or teleconference should occur not less than fifteen days from the postmark date of the informational mailing.

6. Public participation plans must allow for impacted residents to submit comments or questions by telephone or email to the **applicant** for a period of 15 days from the date of the video or teleconference. The minimum public comment period shall be 35 days from the date of the post mark date of the informational flyer.

7. **Applicants** must provide to the DEC staff written comments, if any, and a summary of public comments received.”

Attachment XI

Updated PPP Supplement

Global Albany
Addendum/Updated Public Stakeholder List for the Public Participation Plan

May 17, 2023

Background

As part of the proposed changes to its terminal in Albany's South End neighborhood, Global created a Public Participation Plan that aims to keep members of the community, stakeholders and others informed about the process. Included in that PPP is a list of stakeholders, including: residents and neighborhood groups near the terminal; community, civic, environmental and business leaders and organizations; schools and religious organizations; and government and elected officials.

The PPP was first created in June 2020. It has since been updated to account for circumstances related to the COVID-19 pandemic and other changes that may have arisen. While most of the stakeholders and their associated titles and contact information have remained the same since the initial iteration of the PPP, there have been some updates. This addendum includes updated names, titles and contact information that are all current as of May 17, 2023.

List of Stakeholders

Community, civic, environmental and business leaders and organizations

- Eva Bass, Executive Director, Avillage: executive@avillage.org; general: info@avillage.org, 518-451-9849
- Dominick Casolaro, former Albany Common Council representative, Ward 1
- Alice Green, Executive Director, Center for Law & Justice: info.cflj@gmail.com, 518-427-8361
- Chiquita D'Arbeau, Executive Director, Albany Housing Authority: contact page, 518-641-7518
- Sergeant (Ret.) Leonard Ricchiuti, Executive Director, Albany Police Athletic League: programs@albanypal.org, 518-435-0392
- Justin Reuter, CEO, Boys and Girls Club of the Capital Area: jreuter@bgccapitalarea.org, 518-462-5528 ext. 1001
- Andrea Nicolay, Executive Director, Albany Public Library: contact page
- JoAnn Morton, President, South End Neighborhood Association: southendna@gmail.com or southendneighborhoodassociation@hotmail.com
- Center for Disability Services: info@opwdd.ny.gov, 518-437-5670
- Perry Jones, Executive Director, Capital City Rescue Mission: contact page, 518-462-0459 ext 227
- Bree Barker, Salvation Army Albany: bree.baker@use.salvationarmy.org, 518-463-6678

Schools and religious organizations

- Marc Johnson, Pastor, St. John's Church of God in Christ: stjcogic@gmail.com 518-449-3888
- Jasmine Brown, Principal, Giffen Memorial Elementary School: jbrown@albany.k12.ny.us, 518-475-6650
- Amanda Boyd, Community Site Coordinator, Giffen Memorial Elementary School, aboyd@albany.k12.ny.us, 518-475-6669
- Charles J. Daniel, latest pastor at Calvary Baptist Church, 518-436-9308-
- Thomas Homes, Pastor at the Parish of St. John the Evangelist and St. Joseph, tfvh426@aol.com, 518-449-2232

Government and elected officials

City of Albany

- Kathy M. Sheehan, Mayor of Albany: mayor@albanyny.gov, 518-434-5013
- Corey Ellis, President, Albany Common Council: cellis@albanyny.gov, 518-478-6441
- Sonia Frederick, Albany Common Council, Ward 1: sfrederick@albanyny.gov, 518-533-8110
- Derek Johnson, Albany Common Council, Ward 2: dejohnson@albanyny.gov. 518-470-3827

- Kelly Kimbrough, Albany Common Council, Ward 4, President Pro Tempore: kkimbrough@albanyny.gov, 518-250-9267
- Joseph Gregory, City of Albany Fire Chief: jgregory@albanyny.gov, 518-447-7879
- Eric Hawkins, City of Albany Police Chief: officeofthechief@albanyny.gov, 518-462-8013
- Dorcey Applyrs, Chief City Auditor, dapplyrs@albanyny.gov, 518-434-5023

Port of Albany
- Georgette Steffens, Commission Chairperson, Albany Port District: 518-463-8763
- Rich Hendrick, Chief Executive Officer, Port of Albany: 518-463-8763

Albany County
- Dan McCoy, Albany County Executive: county_executive@albanycountyny.gov, 518-447-7040
- George Penn, Director of Operations, Albany County: 518-447-7040
- Elizabeth F. Whalen, Department of Health Commissioner, 518-447-4580
- Craig Apple, Albany County Sheriff, contactsheriff@albanycounty.com, 518-487-5400
- Andrew Joyce, Chairman, Albany County Legislature: Andrew.joyce@albanycountynw.gov, 518-447-7168
- Carolyn McLaughlin, Albany County Legislature, District 1: Carolyn.Mclaughlin@albanycountyny.gov, 518-376-5120
- Samuel Fein, Albany County Legislature, District 6: sam.fein@albanycountyny.gov, 518-362-8380

State of New York
- Senator Neil Breslin: breslin@nysenate.gov, 518-455-2225
- Assembly Member John McDonald: McDonaldJ@nyassembly.gov, 518-455-4474
- Assembly Member Patricia Fahy: FahyP@nyassembly.gov, 518-455-4178
- Congressman Paul Tonko: 518-465-0700, Contact page
- Basil Seggos, Commissioner, NYSDEC: Contact page, 518-402-8545
- Tom Berkman, General Counsel, NYSDEC: 518-402-8543
- Rosa Mendez, Director, Office of Environmental Justice, NYSDEC: justice@dec.ny.gov, 518-402-8556
- Tony Luisi, Regional Director, Region 4, NYSDEC: r4info@dec.ny.gov, 518-357-2593
- Kate Kornak, Regional Permit Administrator, Region 4, NYSDEC: dep.r4@dec.ny.gov, 518-357-2069
- Jordan Gougler, Office of Environmental Justice: justice@dec.ny.gov, 518-402-8556

Global Albany
Update on PPP Activities Since 2020

June 21, 2023

Background
This is intended to provide an update on Global's community giving and involvement activities since 2020 when we first submitted our Public Participation Plan.

Please know that Global intends to continue with these programs even outside of any regulatory process. We are happy to document these activities, and would be pleased to answer any questions you might have.

Community Involvement
We have a long track record of community involvement in and around Albany. This work is led by Mark Bobb-Semple, our full-time community liaison. Mark has been with Global since 2019. He has decades of experience in community engagement and nonprofit work in Albany.

Mark meets regularly with community leaders, elected officials and residents, including at Ezra Prentice, a housing facility located near to our terminal. Mark also convenes meetings with community members and Global leadership.

We have led tours of the terminal, met with community members, and kept information about our terminal and permit renewal current on our public website, www.globalalbany.com. Our intent with community involvement is to listen to potential concerns from community members, address and mitigate issues whenever possible and share current information about our operations.

Community Giving
With our community giving and engagement work, we seek to direct support to benefit the local community, particularly residents in the South End of Albany, the community closest to our terminal. We focus on a range of sectors including education, youth services, public safety, economic development and more.

Since January 2020, we have donated over $86,000. Global has had the opportunity to support the following non-profit organizations:

Albany Community Outreach
Albany High School
Albany Lady Falcons Basketball Club
Albany Police & Fire Foundation
Albany Police Athletic League, Inc
Albany Pop Warner
AVillage Inc
Boys & Girls Clubs Of Albany
Christ's Church Albany
Homeward Bound Dog Rescue of New York Ltd

Just Be Ready
Lark Street Bid
Miss Shenendehowa Softball Inc
Montgomery County
Noteworthy Resources of Albany
NYS Odyssey of the Mind
Saratoga Miss Softball
The College of Saint Rose
Trooper Foundation-State of New York Inc
Ujamaa Market

Here are some examples of programs we have supported since 2020:

A Focus on STEM
Global has a deep commitment to supporting K-12 STEM education. In Albany, that priority is expressed through the company's financial and volunteer support of the local Giffen Memorial Elementary School and the local Boys and Girls Club.

- With Giffen School, in addition to general support for the school, Global supports a summer intensive program for K-5 that is offered to students who meet specific academic growth criteria.
- With Boys and Girls Club, in addition to general and program-specific assistance for the Club, Global supports the Ultimate Journey program (outdoor and nature learning) as well as the club's STEM afterschool programming.

Global recognizes the important impact of STEM on childhood learning and development. Global is in ongoing dialogue with Giffen School and Boys and Girls Club to look for ways to engage more deeply in supporting STEM learning throughout the year. That work is ongoing.

Internships in Albany
This summer, Global launched an internship program in Albany, New York, hiring two interns. The interns work full-time (40 hours per week) for six months, and will be compensated $18/hour for their work.

Global is actively working to diversify those working in energy and terminal operations, with a specific focus on recruiting women and people of color. Global partnered with community groups to create a diverse candidate pool. The final candidates are both from Albany, and one is from the South End.

The two interns will rotate through different departments at the terminal, learning all facets of terminal operations. The goal is to have them be qualified and competitive for future employment in the field.

Global intends to continue this internship program in Albany, hiring 1-2 interns per year.

We support the Boys & Girls Club of Albany through a variety of programs.

- Global helped start their Ezra Prentice Programs. The Boys & Girls Club has built programs to provide after school support, teen-focused courses, and virtual-learning support at Ezra Prentice.
- Global supports other programs like Friday Teen Night, summer and fall scholastic basketball programs and the Club STEAM initiatives.

- Global provides ongoing Support for Food Programs. We know there is an ongoing need for fresh and healthy food. We appreciate the Club's work to provide meals to the community. We help support that work through donations and via meal delivery, which we provide from our Alltown Fresh® convenience market in Schenectady, New York.
- Global provides fuel for Boys & Girls Club vans.
- Global Community Liaison Mark Bobb-Semple serves on the board of the Boys & Girls Club.

Other Community Support

- Co-hosted an Earth Day community cleanup and cookout with music and conversation at Ezra Prentice Homes. We sponsored this event with our partner, the Boys & Girls Club of Albany, as well as Albany Housing Authority.
- We partner with Giffen Memorial Elementary School supporting their community school advisory board.
- We support the street outreach organization, Just Be Ready with their "Grab and Go" meal delivery program to neighbors in Albany's south and north end.
- Global employees continue to volunteer with the Lark Street Business Improvement District to help with the beautification of Lark Street.
- Global sponsors the Ujamaa Market, a market where predominantly Black-owned small businesses sell artisan goods.

$2 Million to Provide Heating Oil to Families in Need

In addition to ongoing targeted local support, in December 2022, recognizing the unprecedented uncertainty and challenges in the energy market, Global donated $2 million to provide heating oil for those in need. The donation was directed to seven states in the Northeast and distributed to local nonprofit entities serving low-income households.

- $1.3 million was evenly split between Massachusetts and New York.
- An additional $700,000 was split between Connecticut, Maine, New Hampshire, Rhode Island and Vermont.
- This $2 million donation will provide heating fuel to warm an estimated 4,000 households in the Northeast this winter.

Attachment XII

SEQR/EAF

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 Albany - Title V Operational Flexibility Application		
Project Location (describe, and attach a general location map): Global Albany Terminal, 50 Church St, Albany, NY		
Brief Description of Proposed Action (include purpose or need): The proposed project at the Global Albany Terminal ("Terminal" or "Facility") calls for reducing, redistributing and redefining product throughput limits and making other changes at the Terminal as follows: reduce the allowable throughput of crude oil at the Terminal from 1,850 million gallons to 450 million gallons, while increasing the cap on loading refined products by 450 million gallons for a total reduction in Facility throughput of approximately 950 million gallons; increase operational flexibility at the Terminal by allowing the loading of refined product across the Facility subject to certain throughput limitations; install additional controls to more efficiently capture and reduce volatile organic compound (VOC) and benzene emissions and accept lower emission limits on certain existing control equipment; and install exempt heaters/boilers and make other changes to enable management of biodiesel (collectively, the "Project"). The Project would reduce the potential to emit VOCs from the Terminal by approximately 45 tons per year. See the accompanying EAF Supplement for a detailed description of the Project. Sections 2.3, 6.2 and 6.2.1 of the Supplement provide more information on the cap of crude oil, the reduction of VOC PTE, and benzene emissions, respectively.		
Name of Applicant/Sponsor: Global Companies LLC	Telephone: - 781 894 8800 E-Mail: - See Contact Below	
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): -Same As Applicant	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	City of Albany, Building Department	Building Permit may be required; to be discussed with City prior to construction.
e. County agencies	☐Yes ☑No		
f. Regional agencies	☐Yes ☑No		
g. State agencies	☑Yes ☐No	NYSDEC - Air Permit Modification	March 2020
h. Federal agencies	☑Yes ☐No	EPA - Review / Comment on Air Permit Modification	March 2020

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):

Remediaton Sites:546031, NYS Heritage Areas:Mohawk Valley Heritage Corridor

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?
I-2; General 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? City of Albany

b. What police or other public protection forces serve the project site?
City of Albany

c. Which fire protection and emergency medical services serve the project site?
City of Albany

d. What parks serve the project site?
Pocket Park at Broadway & Church (~0.20 mi); Krank Park (~0.25 mi); Mt. Hope Playground (~0.5 mi)

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? Approx 60 acres
b. Total acreage to be physically disturbed? 0.07 acres
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? Approx 60 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)? % 0.1 Units: acres

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: 18 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.
____
____
iv. 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: 300 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: Albany Water Department
- 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: NA

vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: NA gallons/minute.

d. Will the proposed action generate liquid wastes? ☑ Yes ☐ No
If Yes:

i. Total anticipated liquid waste generation per day: <5 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):
Periodic boiler blowdown - see Section 7.0 of the EAF Supplement, Water Quality Impact.

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):

Public facilities will be used.

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: ______

There are no 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)

Exempt boilers - see Air Permit Application and EAF Supplement. Sections 12.1.2 and 12.2 of the EAF Supplement address exempt boilers.

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 blank.

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): 1.02

ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycles for boilers. These period will be minimized in accordance with federal air regulations.

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? **See Section 5 of the EAF and Attachment E for truck route study.** ☐ 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:

See Section 4.0 in the EAF Supplement for more information on energy use.

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other):

Local utility company.

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:

See EAF Supplement, Attachment G for the noise study (Dec. 12th, 2019) for noise associated with operation. Construction noise will be on site and will not impact off site. Construction will be limited to 7 am to 6 pm Monday through Friday.

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:

There may be minor lighting fixtures added related to the boiler installation at the lube oil building. Lighting will be localized and only impact the immediately surrounding area. See EAF Supplement Section 3.1, which proposes changes to the Lube Oil building to accommodate boilers.

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. See EAF Supplement, Section 9.0 and Attachment F for more information on the odor study conducted (Oct. 23rd, 2019).

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 Biodiesel

ii. Volume(s) variable per unit time year (e.g., month, year)

iii. Generally, describe the proposed storage facilities:

Biodiesel storage - see Section 2.2: Bulk Storage Tanks in the EAF Supplement for more information.

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: minor construction waste tons per unknown (unit of time)
- Operation : boiler blowdown tons per NA (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

- Construction: construction waste will be minimal and typical of construction.
- Operation: Boiler wastewater will be reused to the extent practicable

iii. Proposed disposal methods/facilities for solid waste generated on-site:

- Construction: Solid waste generated during construction will be properly managed at a Part 360 permitted facility.
- Operation: Boiler blowdown will be properly characterized and transported to an appropriate treatment facility.

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: ______

Not anticipated. Boiler blowdown will need to be characterized for hazardous waste constituents

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: ______

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 Church Street in a heavily industrial and commercial area of the City of Albany, NY. There are no residences located immediately adjacent to the Terminal. However, the Ezra Prentice Homes are located along South Pearl Street and adjacent to the Kenwood Rail Yard

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	Approx 60	Approx 60	<0.1
• 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: ______	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:

Albany Community Charter School; School Number 17

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:

The Terminal has been a generator of hazardous waste from regular maintenance and tank cleaning and has an EPA Site Identification Number.

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): historical spills

☑ Yes – Environmental Site Remediation database — Provide DEC ID number(s): 546031

☐ Neither database

ii. If site has been subject of RCRA corrective activities, describe control measures: ______

The adjacent site is the Hudson River.

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): 546031, 442004, 442022, V00521, V00464, 442027,...

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s):

Various phases of activity

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: >5 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 Federal Waters, Federal Waters, 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:
Name - Pollutants - Uses:Hudson River (Class C) – Priority Organics – Fish Consumption

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: Principal Aquifer

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): Tidal River
ii. Source(s) of description or evaluation: Environmental Resource Mapper
iii. Extent of community/habitat:
- Currently: 74248.64 acres
- Following completion of project as proposed: 74248.64 acres
- Gain or loss (indicate + or -): 0 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): Shortnose Sturgeon

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: ______
ii. Basis for designation: ______
iii. Designating agency and date: ______

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: Cherry Hill, Mendelson, A., & Son Company Building

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:

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.):

iii. Distance between project and resource: _____ 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 Tom Keefe Global Companies LLC Date 12/15/2020

Signature [signature] Title Vice President, Environmental Health and Safety

EAF Mapper Summary Report

Thursday, February 14, 2019 3:59 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]	Yes
C.2.b. [Special Planning District]	Yes - Digital mapping data are not available for all Special Planning Districts. Refer to EAF Workbook.
C.2.b. [Special Planning District - Name]	Remediaton Sites:546031, NYS Heritage Areas:Mohawk Valley Heritage Corridor
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Yes - Digital mapping data for Spills Incidents are not available for this location. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Yes
E.1.h.i [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Yes
E.1.h.i [DEC Spills or Remediation Site - DEC ID Number]	546031
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]	546031, 442004, 442022, V00521, V00464, 442027, C442035, B00005, B00055, 442009
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]	Federal Waters
E.2.h.v [Impaired Water Bodies]	Yes
E.2.h.v [Impaired Water Bodies - Name and Basis for Listing]	Name - Pollutants - Uses:Hudson River (Class C) – Priority Organics – Fish Consumption

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]	Principal Aquifer
E.2.n. [Natural Communities]	Yes
E.2.n.i [Natural Communities - Name]	Tidal River
E.2.n.i [Natural Communities - Acres]	74248.64
E.2.o. [Endangered or Threatened Species]	Yes
E.2.o. [Endangered or Threatened Species - Name]	Shortnose Sturgeon
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]	No
E.3.e. [National Register of Historic Places]	Yes - Digital mapping data for archaeological site boundaries are not available. Refer to EAF Workbook.
E.3.e.ii [National Register of Historic Places - Name]	Cherry Hill, Mendelson, A., & Son Company Building
E.3.f. [Archeological Sites]	Yes
E.3.i. [Designated River Corridor]	No

STATE ENVIRONMENTAL QUALITY REVIEW (SEQR)
ENVIRONMENTAL ASSESSMENT FORM SUPPLEMENT
GLOBAL ALBANY TERMINAL

GLOBAL COMPANIES LLC - ALBANY TERMINAL
50 Church St
Albany, NY 12202

DEC PERMIT APPLICATION
#4-0101-00070/02003

March 2020

Prepared by:

envirospec
ENGINEERING, PLLC

349 Northern Blvd, Suite 3
Albany, New York 12204

Unauthorized alteration or addition to this
Document is a violation of Section 7209
Subdivision 2 of the New York State Education Law

©Copyright 2020
Envirospec Engineering, PLLC

TABLE OF CONTENTS

ATTACHMENTS

ACRONYMS

AGCs	ANNUAL GUIDELINE CONCENTRATIONS
APCD	ALBANY PORT DISTRICT COMMISSION
APRC	ALBANY PORT RAILROAD CORPORATION
CAA	CLEAN AIR ACT
CLCPA	CLIMATE LEADERSHIP AND COMMUNITY PROTECTION ACT
CO	CARBON MONOXIDE
CO_2	CARBON DIOXIDE
CP RAIL	CANADIAN PACIFIC RAILWAY
CRRA	COMMUNITY RISK AND RESILIENCY ACT
DEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DMR	DISCHARGE MONITORING REPORT
DOS	NEW YORK STATE DEPARTMENT OF STATE
EAF	ENVIRONMENTAL ASSESSMENT FORM
ECL	NEW YORK STATE ENVIRONMETNAL CONSERVATION LAW
EIS	ENVIRONMENTAL IMPACT STATEMENT
EJ	ENVIRONMENTAL JUSTICE
EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FRA	FEDERAL RAILROAD ADMINISTRATION
FRSA	FEDERAL RAILROAD SAFETY ACT
GCL	GENSYNTHETIC CLAY LINER
GHG	GREENHOUSE GAS
HFCs	HYDROFLUOROCARBONS
HMR	HAZARDOUS MATERIAL REGULATIONS
IFR	INTERNAL FLOATING ROOF
LDAR	LEAK DETECTION AND REPAIR
LWRP	LOCAL WATERFRONT REVITALIZATION PROGRAM
MOSF	MAJOR OIL STORAGE FACILITY
N_2O	NITROUS OXIDE
NAAQS	NATIONAL AMBIENT AIR QUALITY STANDARDS
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NSR	NEW SOURCE REVIEW
NYCRR	NEW YORK CODES, RULES AND REGULATIONS
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PBS	PETROLEUM BULK STORAGE
PFCs	PERFLUOROCARBONS
PFOS	PERFLUOROOCTANESULFONIC ACID

PHMSA	PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
$PM_{10/2.5}$	PARTICULATE MATTER (MEASURED IN MICROMETERS)
PPP	PUBLIC PARTICIPATION PLAN
PSD	PREVENTION OF SIGNIFICANT DETERIORATION
PTE	POTENTIAL TO EMIT
RVP	REID VAPOR PRESSURE
SO_2	SULFUR DIOXIDE
SEQR	STATE ENVIRONMENTAL QUALITY REVIEW (ACT)
SF_6	SULFUR HEXAFLOURIDE
SGCs	SHORT-TERM GUIDELINE CONCENTRATIONS
SHPO	NEW YORK STATE HISTORIC PRESERVATION OFFICE
SPCC	SPILL PREVENTION, CONTROL, AND COUNTERMEASURES
SPDES	STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM
STB	SURFACE TRANSPORTATION BOARD
TPY	TONS PER YEAR
TRAP	TRAFFIC RELATED AIR POLLUTION
USDO	UNIFIED SUSTAINABLE DEVELOPMENT ORDINANCE
USDOT	UNITED STATES DEPARTMENT OF TRANSPORTATION
VCU	VAPOR COMBUSTION UNIT
VRU	VAPOR RECOVERY UNIT
WWTP	WASTEWATER TREATMENT PLANT

1.0 INTRODUCTION

Envirospec Engineering, PLLC (Envirospec), on behalf of Global Companies LLC (Global), has prepared a Long Environmental Assessment Form (EAF) and this attached Supplement to the EAF in support of proposed changes at its Albany Terminal (Terminal). Global is submitting an application to modify its Title V air permit (Application) that will afford it operational flexibility to address changing local and regional market conditions while at the same time significantly reducing the allowable Terminal throughput.

As further described in Section 2.3, this Project will include additional air emission control measures, installation of equipment to heat biodiesel, and changes to the truck and rail loading racks to reduce and improve operational efficiency (collectively, the Project). Although the Project requires Global to seek a modification of its existing Title V air permit which triggers a review under the State Environmental Quality Review Act (SEQR), it will not result in significant adverse environmental impacts to the community, including those relating to air quality, odor, noise and truck traffic. This Project EAF Supplement is intended to provide a comprehensive discussion of potential impacts under SEQR as discussed in detail below.[1]

Global met with local community residents, leaders and elected officials prior to submitting its Application in accordance with a written public participation plan and will continue these outreach efforts throughout this permit review process.

[1] This document supplements and expands the information contained in the attached EAF form. References to the section(s) of the EAF supplemented by this document are included, as appropriate.

2.0 FACILITY DESCRIPTION

2.1 Facility Location (EAF Sections A, C, & E)

The Terminal is located on Church Street in a heavily industrial and commercial area of the City of Albany, NY. See Attachment A for a map of the area in the vicinity of the Terminal. The Terminal is located between New York Interstate I-787 and the Hudson River and is adjacent to the heavily industrialized Port of Albany and across the Hudson River from the Port of Rensselaer. The two Ports are collectively regulated by the Albany Port District Commission (APDC) as the Port of Albany. As described in a 2016 report prepared by the APCD (hereinafter the "2016 Port Annual Report"), "[t]he Port of Albany is a year-round, 24-hour facility spanning 300 acres on the Albany and Rensselaer sides of the Hudson River. . . . Operations include a range of tenant functions supported by critical multi-modal transportation resources" (APDC, 2016, p.7). The Albany County South Wastewater Treatment Plant (WWTP), which serves most of the City of Albany and the Port of Albany, is located immediately west of the Port of Albany and south of the Terminal (i.e., between the Terminal and the Port). The WWTP treats sanitary sewage and industrial wastewater.

There are many other industrial and large-scale commercial activities located in the Port of Albany in close proximity to the Terminal. These activities were most recently individually summarized in the 2016 Port Annual Report as follows:

- Gorman Brothers: A construction materials facility that includes the largest deep-water asphalt terminal on the East Coast, a rail terminal, asphalt emulsion manufacturing plants, and transportation facilities.
- Waste Management of New York: A solid waste transfer facility responsible for over 17,000 truck trips annually.
- W.M. Biers: A facility that provides locally produced landscape materials for commercial and residential customers, heavy-duty landscape equipment sales, as well as landscape and tree-removal services. Ten thousand trucks were loaded at the facility in 2015.

- Upstate Shredding/Ben Weitsman: An 18-acre facility that processes scrap metal and transports it to domestic mills and iron foundries with 13,680 annual truck shipments into and out of their Port facility.
- Mohawk Paper Mills: A global producer of high-performance papers for design and publishing. The company's Port warehouse and distribution center is home to a world-class digital printing center. Mohawk Paper is used in publications with a world-wide reach, with 5,000 annual truck shipments of paper delivered throughout North America.
- Westway Feed Products: A facility that produces custom liquid animal feed supplements, fertilizer, and agricultural-based wastewater treatment solutions for farms throughout the Northeast U.S. with 3,131 truckloads of liquid product transported.
- Buckeye Partners: A facility permitted to store and transport crude oil, refined petroleum products (including asphalt) and ethanol. Products are delivered to and/or shipped from the Buckeye facility by rail, truck and vessel.[2]

The Port of Albany also is the home of a large-scale stevedoring operation and a major grain elevator, among other businesses (APDC, 2016).

Currently, the Port of Albany and adjacent industrial areas, including the location of the Terminal, are part of a major corridor for rail freight lines through the City of Albany that are operated by Canadian Pacific Railway (CP Rail), CSX Corporation, and short-line haulers. The Kenwood Rail Yard, which is owned by CP Rail, facilitates rail deliveries to a number of locations within and adjacent to the Port. A portion of the Kenwood Rail Yard is leased to Global and is used to offload product (herein referred to as the rail offload area). Beyond the Kenwood Rail Yard, CP Rail and CSX operate active rail lines throughout New York's Capital Region and in interstate commerce. The Port of Albany itself is served by the Albany Port Railroad Corporation (APRC), which is jointly owned and operated by CSX and CP Rail. The APRC provides on-site industrial track services and moves heavy lift and other commercial cargo through the Port using a 20-mile standard-gauge switching railroad, heavy lift, and on-

[2] Buckeye also maintains a petroleum bulk storage facility on the Rensselaer side of the Port along the Hudson River.

dock rail (APDC, 2016). Under federal law, discussed in Section 10.0 below, State and local control over the routine transportation-related activities of trains within the Kenwood Rail Yard are preempted by federal law.

There are no residences located immediately adjacent to the Terminal. However, the Ezra Prentice Homes—a 179-unit complex of garden apartments managed by the Albany Housing Authority—is located south of the Albany County WWTP along South Pearl Street and adjacent to the Kenwood Rail Yard. Albany's South End neighborhood is located northwest of the Terminal on the opposite side of Interstate 787.

2.2 Description of Terminal (EAF Section A)

The Terminal is an important hub for the receipt, storage and distribution of petroleum products and renewable fuels, such as ethanol, to customers in the Capital Region and beyond and is an important component of the energy infrastructure of the Northeast. Petroleum products have been stored at, and transported from, the Terminal since the 1920s. This use predates many of the uses in the surrounding area—including the Ezra Prentice Homes—by several decades. Global acquired the Terminal from ExxonMobil in 2007.

Currently, the Terminal is a 63-acre licensed, permitted and operational bulk storage and transfer terminal consisting of storage tanks and truck, rail and marine loading and offloading facilities. Terminal operations include storage, blending and distribution of various petroleum and related products including, but not limited to, refined petroleum products (e.g., gasoline, distillate, kerosene, heating oil), additives, ethanol, crude oil, and petroleum product/water mixtures. Products are delivered to and shipped from the Terminal by marine vessel, rail and truck and are stored in the tanks. Key components of the Terminal are described in greater detail below:

- **Bulk Storage Tanks:** The Terminal is the site of 16 bulk storage tanks ranging in size from 1.5 to 5.8 million gallons. Tanks used to store gasoline, crude oil, and ethanol are equipped with internal floating roofs (IFRs) to control emissions.

- **Truck Loading Rack:** The truck loading rack consists of eight loading positions. Product is pumped from the tanks to the truck loading rack where it is dispensed into trucks for delivery to retailers and other customers. Emissions from the truck loading rack are controlled by a vapor recovery unit (VRU).
- **Rail Loading / Unloading:** The rail loading rack consists of eight loading positions. Product is pumped from the tanks to the loading area where it is dispensed into railcars for transport. Emissions from rail loading are controlled by a vapor combustion unit (VCU). In addition, products are offloaded from railcars into the tanks at the rail offload area leased from CP and at a small spur located adjacent to the rail loading rack.
- **Marine Dock:** The marine dock is equipped with one position for loading or offloading products from vessels. Emissions from vessel loading are controlled by one of two VCUs.

Operations at the Terminal are governed by numerous federal and State laws and regulations, many of which require permits, licenses or other approvals. Of particular relevance to this submission, the Terminal is subject to a Title V air permit issued pursuant to 6 NYCRR Part 201. Global's current Title V permit requires compliance with federal and State air emission control requirements and includes limits on the amount of certain products that can be loaded at the racks. In addition, the VRU and VCUs must meet specific limits on the quantity of VOCs that may be emitted, measured in milligrams of VOC emitted per liter of product loaded (mg/L). A Site Plan showing the layout of the Terminal is included as Attachment B.

2.3 Description of Project (EAF Sections A, D.1, & D.2)

In 2015, Global submitted a timely and complete application to renew its Title V air permit to the New York State Department of Environmental Conservation (DEC) that did not seek any significant changes to the permit. DEC has not yet processed the renewal application. The Project is a modification separate from the previously submitted renewal. Global is requesting that DEC renew its existing permit and approve its request for a Title V air permit modification for the Project at the Terminal.

The Project will benefit the community and the environment through the installation of equipment to more efficiently capture and control emissions from the Terminal's loading operations. In addition, the Project will enable the Terminal to handle biodiesel consistent with the State's goals of increasing renewable fuel use, while reducing the allowable throughput at the Terminal by nearly one-third, or almost one billion gallons. At the same time, the Project will provide Global with the ability to adjust to changes in the market as well as enhance loading capabilities to provide better service to its customers, while significantly reducing the allowable crude oil throughout.

A more detailed description of the Project is set forth below.

Operational Flexibility:
Currently, loading of gasoline and ethanol at the Terminal is capped at each of three loading areas: the truck loading rack, the rail loading rack, and the marine dock. Loading of distillate products (including diesel fuel, heating oil and kerosene) is capped on a facility-wide basis. The Project includes the addition of a facility-wide cap that incorporates all refined products (including gasoline, ethanol, distillates, blendstocks, and biodiesel) as well as a reconfiguration of the existing sub-caps at each of the loading areas. This reconfiguration of the caps will allow flexibility in the type and volume of products distributed at the individual loading areas to adjust to changing market conditions, while ensuring against major changes in truck or rail traffic.

In addition to the refined product caps listed above, the current permit contains a separate cap on loading crude oil at the marine dock. As part of the Project, Global will reduce the cap on crude oil by over 75%, from 1,850 million gallons to 450 million gallons, while increasing the cap on loading refined products by 450 million gallons for a total reduction in facility throughput of approximately 950 million gallons.

A summary of the existing and proposed caps for refined products and crude oil is provided below. As part of the Project, Global is proposing to accept subcaps on the truck and rail loading racks and at the marine dock (for refined products) based on current allowable throughput levels at those racks. These subcaps are designed to limit potential truck, rail and marine traffic to current allowable levels.

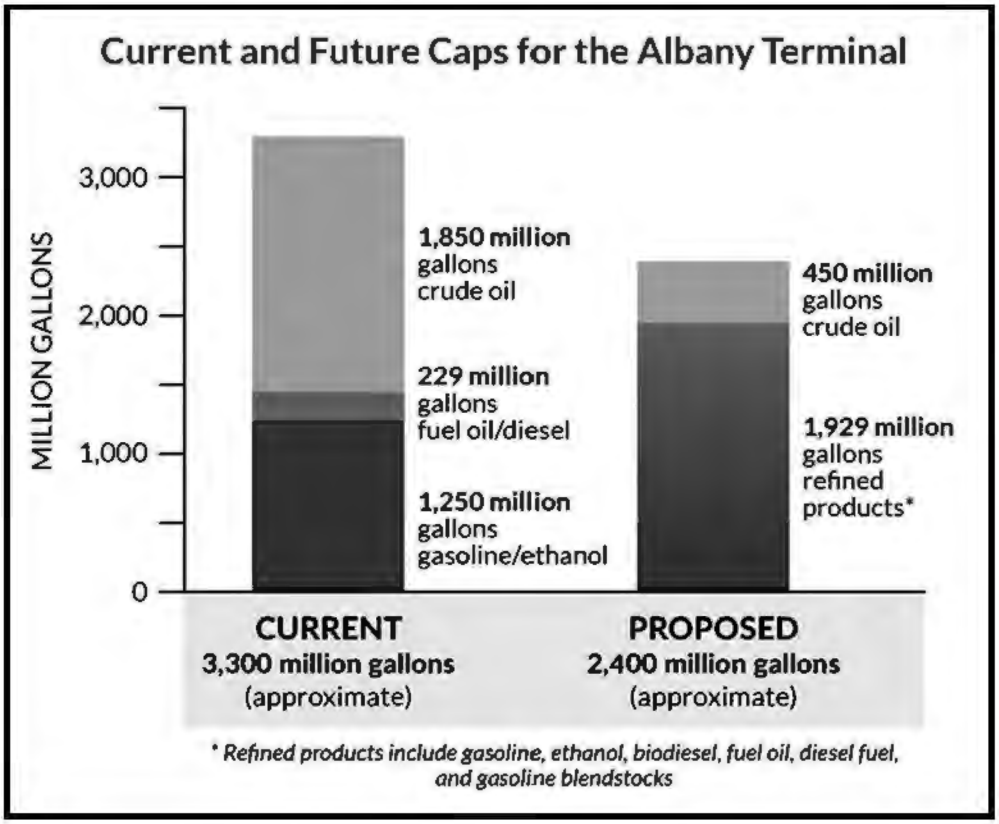
Product Throughput Caps Before and After Project

Description of Cap	Current Permit Cap (gals)*	Proposed Permit Cap (gals)*
REFINED PRODUCTS		
Distillate Facility-wide Loading	229,300,000	see below
Truck Loading Gas/Ethanol	650,000,000	see below
Rail Loading Gas/Ethanol	150,000,000	see below
Marine Loading Gas/Ethanol/Distillate	450,000,000	see below
Overall Refined Products**	n/a	1,929,000,000
Sub-caps***		
Truck Loading Rack	n/a	880,000,000
Rail Loading Rack	n/a	300,000,000
Marine Dock (refined products)	n/a	900,000,000
CRUDE OIL		
Marine Dock (Crude Oil)	1,850,000,000	450,000,000
Total Facility Throughput	3,329,300,000	2,379,000,000

Notes:
* Caps are maximum allowed throughput on a rolling 12-month basis.
**Gasoline Blendstock Cap – Global is currently permitted to store up to 380,000,000 gallons of gasoline blendstock for gasoline blending, Under the proposed permit, Global would also be allowed load up to 380,000,000 gallons of gasoline blendstock. This blendstock will count against the total refined product cap.
***Product loaded under each sub-cap is counted against the facility cap of 1,929,000,000 gallons. These caps limit loading of refined products at the truck and rail rack to current allowable levels.

The bar graph below depicts the caps on refined product and crude oil before and after the Project.

Product Throughput Cap Summary



Loading Rack Modifications:

Currently, the truck loading rack is equipped with eight loading positions. Operation of the truck loading rack can become congested and is constrained during daily busy periods. The Project includes the addition of two loading positions to the truck loading rack to improve efficiency and reduce customer wait time and truck idling time. Although the rack change is not designed to increase the daily or annual throughput at the loading rack, the instantaneous flow at the rack will increase because of the additional loading bays.

The rail loading rack is equipped with eight loading positions. Since the rail loading area can accommodate up to fifteen railcars, loading all fifteen cars can require a locomotive to move the loaded cars out of the loading positions and move the empty cars into position. To improve efficiency and reduce locomotive use, the Project includes the addition of seven loading positions at the rail loading rack. The additional loading positions are not designed to increase the loading rate at the rack but will allow railcars to be loaded more efficiently and eliminate the need for interim movement of railcars to load certain trains.

Enhanced Air Emission Controls:

Global will install additional air emission controls and accept strict uniform limits on all primary controls at the Terminal, consistent with its goal of improving operational flexibility and benefitting the community and environment as follows:

- Stack emission limits at the marine and rail loading VCUs will be lowered to 2 mg/L to be equivalent to the emission limit at the truck loading rack. This change will reduce the emission limit for the Terminal's existing primary marine loading rack from 3 mg/L to 2 mg/L. The emissions limit at the rail rack will be reduced from 10 mg/L to 2 mg/L. By accepting a strict emission limit of 2 mg/L across all primary emission control systems at the Terminal, Global can more easily move products among the various racks, providing flexibility.[3]
- A vacuum enhanced control system will be installed at the rail loading rack to ensure negative pressure loading, a change which will significantly reduce, if not eliminate, fugitive emissions from rail loading. Negative pressure loading was implemented at the marine dock in 2017. Permit conditions will be implemented as part of the Project that require the negative pressure loading at the rail loading rack and the marine dock for non-inerted marine vessels.

Biodiesel Handling and Storage:

Global is proposing to install equipment that will facilitate the handling and storage of biodiesel as follows:

- Install heating coils in Tank 30 and authorize storage of biodiesel with a maximum storage temperature of 120^{o} Fahrenheit in Tanks 30 and 33.[4]

[3] The existing backup marine loading VCU will remain permitted at 10 mg/L.

[4] Biodiesel may solidify or become non-pumpable requiring heating to return it to a pumpable state for loading and storage. Tank cars carrying biodiesel are equipped with a jacket of noncontact piping that is located on the

- Install natural gas-fired steam boilers and oil heaters to heat railcars, Tanks 30 and 33, as well as associated product lines, as necessary, to manage biodiesel. The boilers will be housed in the existing Lube Oil Building. The oil heaters will be located in other existing on-site structures.

<u>Crude Oil Restrictions and Throughput Reductions</u>:
As previously noted, the Project will reduce the crude oil cap in the permit from 1,850 million to 450 million gallons per year; a 1,400-million-gallon decrease. This drastic reduction returns allowable crude oil throughput to pre-2012 levels. A permit condition will be added to limit the average Reid Vapor Pressure (RVP)—a measure of volatility—of crude oil to an annual average of 12.5 psi, with the point of compliance based on monthly tank samples.

2.4 Description of SEQR Process

SEQR requires government agencies issuing permits or other approvals to determine whether a Project will have a significant adverse environmental impact. The regulations distinguish among three types of actions for SEQR review purposes: Type I (actions listed in 6 NYCRR Part 617 that are likely to have a significant adverse environmental impact), Type II (actions listed in 6 NYCRR Part 617 that will not have a significant adverse environmental impact), and unlisted (actions that are neither a Type I nor a Type II action). The Project is an unlisted action under SEQR.

DEC has issued a pair of forms to be used to help the applicant assess the potential impact of its project—the short and long environmental assessment form. Global is using the long EAF—together with this Supplement—to provide important background information about the Terminal and the Project.

---

outside of the railcar and/or coils within the cars. The railcar's noncontact piping will be attached to a hose upon arrival at the Terminal where steam will flow around the railcar through the jacket of piping similar to an old fashion home radiator. The heating will return the biodiesel to a pumpable state, enabling it to be pumped to Tanks 30 and 33, which will be similarly heated by circulating hot oil through heating coils within the tanks. The boilers and heaters will not be used to heat crude oil or other products managed at the Terminal.

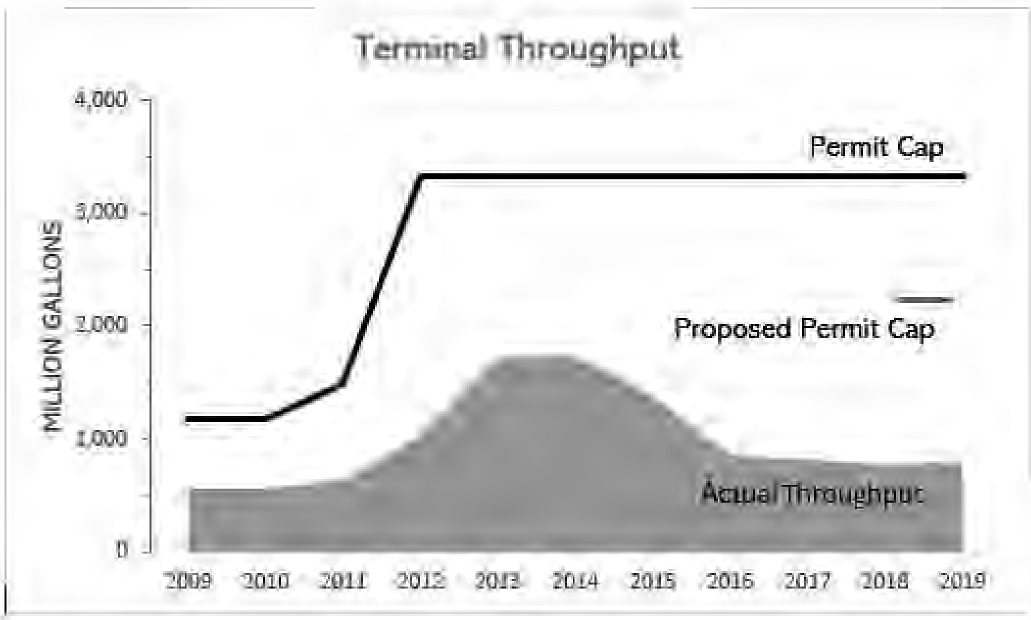
As articulated in the SEQR regulations,

> The basic purpose of SEQR is to incorporate the consideration of environmental factors into the existing planning, review and decision-making processes of State, regional and local government agencies at the earliest possible time. To accomplish this goal, SEQR requires that all agencies determine whether the actions they directly undertake, fund or approve may have a significant impact on the environment, and, if it is determined that the action may have a significant adverse impact, prepare or request an environmental impact statement. (6 NYCRR § 617.1(c))

To determine whether a proposed unlisted action—such as the Project—may have a significant adverse impact on the environment, the agency must consider "the impacts that may be *reasonably expected* to result from the proposed action against various criteria that are considered "indicators of significant adverse impacts on the environment" (6 NYCRR § 617.7(c)(1)) (emphasis added). Of particular relevance to the Project, the agency must consider whether there will be "a substantial adverse change in existing air quality, ground or surface water quality or quantity, traffic or noise levels; a substantial increase in solid waste production; a substantial increase in potential for erosion, flooding, leaching or drainage problems" (6 NYCRR § 617.7(c)(1)).

The SEQR regulations do not specifically discuss how to determine the "baseline" for purposes of assessing whether there is a substantial adverse change to the environment resulting from a project. In the case of a "greenfield project" (i.e., a new project built on previously undisturbed land) assessing impacts is comparatively simple. However, in the case of an existing industrial facility that has served as a petroleum storage terminal for almost 100 years, the assessment is considerably more complex. Over time, the amount of activity at the Terminal (and the associated impacts from that activity) has varied based on market and other factors. The baseline for assessing whether the Project will have a significant adverse environmental impact must take account of these variations.

For purposes of assessing changes from the Project and whether those changes will have a significant adverse impact on the environment, Global has considered for "baseline" purposes both the range of allowable activity since shortly after it acquired the Terminal in 2007 and its past actual activity. A graph illustrating the Terminal's actual and allowable throughput from 2009 to the present is set forth below:



As this graph shows, both the Terminal's actual and allowable throughput have varied significantly over time based on market and other factors. In assessing whether the Project will have a significant adverse impact relative to past operations, these fluctuations must be taken into account. The baseline should not be dictated by a slowdown or spike in operations occurring at the time of the SEQR review.

Also, as previously noted, the SEQR regulations require consideration of "impacts that may be reasonably expected to result from the proposed action" (6 NYCRR § 617.7(c)). Impacts thus must be considered for SEQR purposes only if they can reasonably be linked to the proposed action under review. This requires an assessment of both actual and allowable activity before and after a proposed project. If the impacts could have occurred during the course of normal operations before the change they cannot reasonably be linked to the proposed action.

Operations at the Terminal are governed by various throughput caps and other requirements in the Terminal's Title V air permit. As the graph above shows, the Terminal currently operates below these caps. Global thus could significantly increase the throughput at the Terminal now and remain below its caps regardless of whether it implements the Project. The Project calls for reducing overall Terminal throughput and reallocating the remaining throughput among the various products handled at the Terminal—an action that is not reasonably expected to cause impacts different from those associated with simply increasing operations under the current permit.

Because the Project is not designed to alleviate an immediate need, as would be the case if current operations were at or near the permit caps, it is difficult to assess what impacts could be *reasonably expected* to result from the proposed operational flexibility provisions. For instance, the current permit establishes a separate facility-wide cap that allows it to throughput up to 229.3 million gallons of distillate product. Under the Project, the existing distillate cap would be incorporated into the overall refined products cap. While Global has no business prospects that indicate the existing distillate cap will be exceeded, having the operational flexibility to load any refined product under the facility refined products cap would account for fundamental changes driven by the market or regulations that may occur in the future and change the landscape of petroleum distribution, such as increased demand for biodiesel or renewable diesel.

As discussed below, the Project will not significantly change activities at the Terminal relative to those already allowed under the Terminal's existing permits or in relation to past actual operations and will not result in significant adverse environmental impacts for SEQR purposes.

3.0 ZONING/LAND USE AND CONSISTENCY WITH LOCAL/REGIONAL PLANS

3.1 Zoning/Land Use (EAF Sections C.3 & E.1)

The Project does not impact the zoning of the site. Development in the City of Albany is governed by the 2017 Unified Sustainable Development Ordinance (USDO). The Terminal is located in the I-2 General Industrial District, which includes the Port of Albany. A copy of the zoning map is included as Attachment C. The stated purpose of the district "is to provide for industrial uses associated with the Port of Albany as well as those with greater noise, glare, or heavy traffic impacts in locations that are typically separated from nearby residential neighborhoods." USDO § 375-2(E)(2)(b). The USDO authorizes "heavy manufacturing" in the I-2 district, which is defined as:

> The assembly, fabrication, or processing of goods and materials using processes that ordinarily have greater than average impacts on the environment, or that ordinarily have significant impacts on the use and enjoyment of other properties in terms of noise, smoke, fumes, odors, glare, or health or safety hazards. Examples include, but are not limited to: scrap metal processing facilities, battery, chemicals, machinery, plastics manufacture, and mining not otherwise prohibited in the City. . . . USDO § 375-6(B).

The processing of petroleum components to produce saleable products at the Terminal is a permitted heavy manufacturing use. Therefore, the Project does not impact the zoning of the site.

As part of the Project, Global is proposing to modify the existing Lube Oil Building to accommodate installation of the natural gas-fired boilers needed to heat biodiesel. This change may require a building permit from the City of Albany. This type of approval is a Type II action under SEQR (6 NYCRR § 617.5(c)(25)).

3.2 Consistency with City of Albany Comprehensive Plan (EAF Section C.2a)

The Project is consistent with the City of Albany's Comprehensive Plan, titled ALBANY 2030: The City of Albany Comprehensive Plan. The Comprehensive Plan includes an initiative to, "Determine requirements and investments to maximize the use of rail operations in support of the Port and examine potential for incentives that would encourage the use of freight rail rather than trucks." The Comprehensive Plan also includes suggested strategies and actions such as, "Leverage port assets and integrate with freight rail," and "Modernize the port to accommodate increased demand" (City of Albany, 2012, p. 111). The Project is consistent with each of these goals.

The Project is also consistent with suggested actions in the Comprehensive Plan. In particular, the Project "preserves industrial waterfront uses in the vicinity of the port to support future job growth and allow for future expansion if necessary" (City of Albany, 2012, p. 112). As discussed in Section 12.0 below, in assessing the Project, Global assessed implications of climate change and sea level rise. These considerations will factor into the design and construction of the Project. Consistent with 6 NYCRR § 617.7(c)(1)(iv), the Project does not create "a material conflict with a community's current plans or goals as officially approved or adopted" in the Comprehensive Plan.

3.3 Consistency with Local Waterfront Revitalization Program (EAF Section B.i.*ii*)

The Project is consistent with the City of Albany's Local Waterfront Revitalization Program (LWRP) adopted in conjunction with the New York State Department of State (DOS) for the preservation, enhancement, protection, development, and use of the State's coastal and inland waterways and adjacent waterfront land (City of Albany, 1991, sec. *Introduction*).[5] Projects which may impact coastal areas or inland waterways must be reviewed for

[5] The City of Albany began review of the LWRP as part of the Albany 2030: City of Albany 2013 Comprehensive Plan. To date, however, no changes to the LWRP have been made.

consistency with those LWRPs that pertain to territory within the project area. The Albany LWRP refines and supplements the State’s Coastal Zone Management Program.

The City of Albany has adopted a LWRP containing its plan for Albany's Hudson River waterfront. The LWRP is designed to provide a framework for ensuring consistency between local, state, and federal policies and decisions. The Albany LWRP is divided into Four Sub-Areas—Patroon Island, Downtown, South End, and the Port. The Terminal is located wholly within the Port Sub-Area. The Port Sub-Area, which has access to the sea—has long been important to the City's development. As noted in the Albany LWRP, "Albany's port is the only upstate port with access to ocean-going vessels that operates ice-free, year-round. The City's later emergence as a highway and rail center, in part fostered by the attraction of the Port and its facilities, has further contributed to that development" (City of Albany, 1991, sec. II-4 (d)). The LWRP further states that the Port, as the largest industrial district in the City, is a facility of great regional importance handling the distribution of a wide range of products. The LWRP lists water-dependent commercial activities involving petroleum, automobile products, grain, molasses, wood pulp, scrap metal and other recyclable materials (City of Albany, 1991, sec. II-8(B)(4)). The proposed changes will have no effect on the local waterfront. Consistent with 6 NYCRR § 617.7(c)(iv), the Project does not create “a material conflict with a community's current plans or goals as officially approved or adopted” in the LWRP.

4.0 ENERGY USE (EAF Section D.2)

Although the Project will use energy to operate the negative pressure loading system, boilers, heaters and other ancillary equipment, it will not result in a “major change in the use of the quantity or type of energy” (6 NYCRR § 617.7(c)(1)(vi)). There are no significant adverse impacts related to energy use associated with the Project.

5.0 TRAFFIC ANALYSIS (EAF Section D.2)

The Project will not significantly impact the volume or type of truck, train, or marine traffic. The primary traffic-related impact of concern in the vicinity of the Terminal is the comparatively high volume of truck traffic travelling on South Pearl Street south of the Terminal in front of the Ezra Prentice Homes. Several recent studies, including one conducted by Global, show that the Terminal does not contribute significantly to traffic on this section of South Pearl Street. Although the Project calls for the addition of two loading positions at the truck rack, this change will not affect overall traffic volumes as it will not result in a daily increase in truck volume. With respect to rail traffic, the 1,400 million gallon reduction in allowable crude oil throughput will significantly reduce the potential number of crude oil trains. More generally, the Project will not have a significant adverse impact on rail or marine traffic as it does not increase the overall allowable throughput at any of the loading racks. To ensure against future traffic impacts, the Project includes throughput sub-caps at each rack to limit potential truck, rail and marine traffic to current allowable levels.

5.1 Truck Traffic

The Terminal and Port are located adjacent to Interstate 787, a main highway through the Albany area. The highway is connected to the NYS Thruway, located south of the Port. I-787 crosses South Pearl Street/Rt 32. The Ezra Prentice Homes are located on South Pearl Street/Rt 32, which is on the direct route from the south Port entrance to I-787. South Pearl Street is subject to considerable truck traffic. In addition to the south Port entrance, less than one mile south of Ezra Prentice on South Pearl Street is the Sierra Processing/Waste Connections Materials Recovery Facility, which receives mixed recyclable solid waste (paper/cardboard, glass, plastic, metal) by truck from homes and businesses and separates it for recycling purposes. Numerous other businesses located on South Pearl Street between Ezra Prentice Homes and the Normanskill to the south have the potential to generate heavy truck traffic in front of Ezra Prentice. Additional businesses located beyond the Normanskill on River Road in the Town of Bethlehem also use South Pearl Street.

Several studies have been conducted to assess traffic impacts on South Pearl Street both generally and in relation to the Port. The first such study was prepared by Creighton Manning Engineers on behalf of the Port of Albany (Creighton Manning, 2016). Automatic traffic recorders were installed at five locations around Ezra Prentice, including one at South Port Road east of South Pearl Street to capture traffic entering and exiting the Port to the south of Ezra Prentice. The resulting memorandum, dated October 31, 2016, "summarized the existing truck traffic and truck travel patterns in the south Albany area near the Port of Albany" looking specifically at the number of heavy vehicles traveling on South Pearl Street adjacent to Ezra Prentice. Among other things, the study found that approximately 1 in 6 heavy vehicles on South Pearl Street adjacent to Ezra Prentice Homes is traveling to and from South Port Road. The study did not specifically address the impact of truck traffic to and from the Terminal on South Pearl Street in front of the Ezra Prentice Homes or on the South End neighborhood generally.

More recently, the Capital District Transportation Committee commissioned a study of truck and other heavy-duty vehicle traffic along South Pearl Street in the vicinity of the Ezra Prentice Homes. The final study—entitled *City of Albany: S. Pearl St. Heavy Vehicle Travel Pattern Study* was issued in August 2018 and concluded that most of the traffic affecting Ezra Prentice originated from or was traveling to destinations along South Pearl Street. (Capital District Transportation Committee, 2018, p.5).

The study was conducted with traffic counts and a license plate survey. New York State Department of Motor Vehicles registration data was used to distinguish between different vehicle types. The study concluded, among other things, that: (1) 81% of northbound heavy vehicles that pass Ezra Prentice originate between Ezra Prentice and South Port Road (encompassing, among other things, the Port and the Waste Connections/Sierra Processing facility, which is located north of South Port Road); (2) only 3% of southbound vehicles that pass Ezra Prentice originate from Church Street East of 787 (i.e., the area in the immediate vicinity of the Terminal); (3) 62% of southbound heavy vehicles originate from the 787 southbound access roadway/Green Street; and (4) 35% of southbound heavy vehicles originate from South Pearl Street, north of 1st Avenue (i.e., within the City of Albany but outside the study area). A map of the study is included as Attachment D along with the monitoring locations and northern and southern traffic patterns as presented in the study. The study data confirms that trucks entering and exiting the Terminal are not contributing significantly to heavy-duty truck traffic on South Pearl Street in front of Ezra Prentice.

To further confirm that Global trucks do not contribute significantly to transportation impacts on South Pearl Street in the vicinity of Ezra Prentice, Global commissioned its own study of truck traffic entering and exiting the Terminal, entitled *Global Company LLC, Truck Route Study.* The study report, which was completed by Alta Planning and Design in 2019, is included as Attachment E. A license plate survey was conducted to confirm the route of trucks entering and exiting the Terminal. The purpose was to determine how many trucks from the Terminal contributed to local traffic on South Pearl Street. License plate information was collected over two 12-hour periods between the hours of 4:00 a.m. and 4:00 p.m. at the Terminal and at Ezra Prentice. Out of 419 trucks documented on South Pearl Street during the study period, less than 6% were attributed to the Terminal. Out of 286 trucks recorded at the Terminal during the study period, less than 10% traveled to South Pearl Street. The Global study confirmed that truck traffic into or out of the Terminal does not significantly contribute to the traffic at Ezra Prentice.

Although the Terminal contributes comparatively little to the truck traffic on South Pearl Street near Ezra Prentice, Global is committed to reducing the potential for traffic-related impacts to Ezra Prentice associated with its activities. Consistent with that commitment, Global has contacted the owners/operators of trucks entering and leaving the Terminal and asked them to bypass South Pearl Street and use alternative routes whenever possible.

Going forward, the Project is not expected to result in significant adverse traffic impacts relative to current operations. Although the Project calls for the addition of two loading positions to the truck rack, the additional loading bays are designed to alleviate short-term congestion at the truck rack which currently results in long wait times and increased idling times for vehicles during certain times of the day. Additional truck traffic is not anticipated as a result of the Project. The shift in throughput to refined products is a result of market changes and the need for product throughput flexibility. It is not expected to result in an increase in truck traffic. Moreover, the total throughput at the truck rack will continue to be limited at the existing allowable level of 880 million gallons.

In short, the studies show that the Terminal does not contribute significantly to truck traffic in front of Ezra Prentice, and the Project will not change that fact. More generally, the Project will not significantly change truck traffic to and from the Terminal.

5.2 Rail Traffic[6]

Rail traffic at the Terminal consists of both incoming and outgoing railcars. As set forth in greater detail below, the Project will not result in significant adverse impacts relating to rail traffic. With respect to outgoing rail traffic, the Applicant has proposed to cap throughput at the rail loading rack at 300 million gallons, 80 million gallons less than currently allowed to be throughput at the rail rack.

Various products are delivered to the Terminal by rail. Prior to entering the Terminal's rail offload area, CP Rail typically stages the trains at various locations in the Kenwood Rail Yard and in the vicinity of the Terminal, including the siding located behind the Ezra Prentice Homes. When the railcars are ready to be offloaded, they are moved into the rail offload area, well north of Ezra Prentice. The movement of trains to and from the Terminal is handled by CP Rail. Global's responsibility is limited to the actual offloading of product into the tanks at the Terminal. Products also are loaded from tanks into trains at the rail loading rack for shipment.

As part of the Project, Global is proposing to significantly reduce the allowable crude oil throughput at the Terminal from 1,850 million gallons to 450 million gallons—a 1,400 million gallon decrease. Such a reduction completely eliminates the increase in crude oil throughput

[6] Note that the long-form EAF does not specifically require an assessment of the impact on rail traffic of projects undergoing SEQR review. The Applicant has included this information to provide a thorough assessment of the potential impact of the Project on the surrounding community.

that the DEC authorized in 2012. The steep reduction in allowable crude oil throughput significantly reduces the number of crude oil trains that potentially may be received at the Terminal. Moreover, this major reduction in crude oil throughput is also significant relative to past activity at the Terminal. During the peak 12-month period for crude oil movement from January 2014 to January 2015, Global shipped 1,205 million gallons of crude oil at the Terminal. The reduction in allowable crude oil to 450 million gallons thus represents a reduction in crude oil throughput of 755 million gallons from actual past conditions.

The Terminal is currently operating below capacity and thus is capable of handling additional rail traffic. The Project will not increase rail traffic beyond the levels the Terminal can currently accommodate under the existing permit. Although actual levels of rail traffic may increase from recent short-term levels depending on market conditions, these fluctuations are consistent with past operations at the Terminal and could be accommodated now under Global's current permit. Moreover, any increase will not pose a significant adverse impact under SEQR.

Finally, Global is proposing to cap the total throughput for all products at the rail loading rack at 300 million gallons, down from approximately 380 million gallons. (This rack is currently permitted to load 150 million gallons of gasoline/ethanol and 229.3 million gallons of distillate per 12-month period for a total of 379.3 million gallons). The proposed scenario allows for a combined 300 million gallons of any refined products to be loaded, approximately 80 million less than currently allowed.

5.3 Marine Traffic

Marine traffic from the Terminal will not be significantly impacted as a result of this Project.[7] Currently, the Terminal has one marine loading position that is equipped with two VCUs, a primary and secondary. Product is delivered to and shipped from the Terminal by marine vessels.

[7] Note that the long-form EAF does not specifically require an assessment of the impact on marine traffic of projects undergoing SEQR review. The Applicant has included this information to provide a thorough assessment of the potential impact of the Project on the surrounding community.

As previously noted, Global is proposing to significantly reduce the allowable crude oil throughput from 1,850 million gallons to 450 million gallons, the amount allowed in 2012. This reduction in allowable crude oil throughput significantly reduces the number of crude oil vessels that may be loaded at the Terminal. This major reduction in crude oil throughput is also significant relative to past actual activity at the Terminal.

The allowable throughput for all products at the marine dock will be capped at 1,350 million gallons, which is 950 million gallons less than previously permitted. This cap will help ensure that environmental impacts associated with loading activities at the marine dock will not change significantly as a result of the Project. Compared to actuals, there could be in an increase in marine traffic when compared to recent short term actuals. However, this increase will not pose an adverse environmental impact.

6.0 AIR IMPACTS

As set forth in greater detail below and in the accompanying Application, the Project will not have a significant adverse impact on air. As discussed in Section 2.3 above, Global is proposing to: (1) realign the truck loading rack, rail loading rack and marine dock loading caps to provide operational flexibility and increase the overall product caps for refined products by 450 million gallons while reducing the crude oil cap by 1,400 million gallons; (2) add loading positions at the truck loading rack and the rail loading rack; (3) establish more stringent emission limits for the primary marine loading VCU and the rail loading VCU; (4) install equipment to load under negative pressure at the rail loading rack to significantly reduce if not eliminate fugitive emissions from loading operations;[8] and (5) install exempt boilers, heaters and other equipment to heat biodiesel. Certain of these changes require Global to seek a significant Title V permit modification from DEC.

[8] As discussed in Section 2.3 above, the marine dock is already equipped with vacuum assisted loading. This equipment will be incorporated into the permit as part of this Title V application.

This section outlines the analysis used to determine that the Project will not have a significant adverse impact on air. The SEQR analysis considered the following potential impacts associated with the Project:

- Reduction in crude oil throughput accompanied by a much smaller increase in refined product throughput.
- Reduction of fugitive emissions at the rail loading rack associated with negative pressure loading.
- Increase in emissions from equipment leaks associated with additional loading positions at the truck loading rack and the rail loading rack.
- Combustion emissions associated with boilers and heaters used to store and handle biodiesel.
- Tank emissions associated with storage of biodiesel.

6.1 Air Emissions Generally

Under the federal Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide, particulate matter (including PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO) and lead. The NAAQS define what is considered "clean" air for purposes of the CAA. States monitor ambient air quality for these substances to determine whether the air in a given area is meeting (i.e., has attained) a particular NAAQS. The Terminal is located in the Albany air quality control region, which is currently designated as in attainment for all six of these substances, as set forth in the EPA Nonattainment Areas for Criteria Pollutants (Green Book). The most recent *New York State Ambient Air Quality Report for 2018* confirms that the nearest multi-pollutant air monitoring station—which is located in Loudonville, New York, is in compliance with NAAQS for the four substances monitored at the station: ozone, $PM_{2.5}$, SO_2 and CO. An additional air monitoring station located at the Albany County Health Department building in the South End also shows that the City of Albany is in attainment for $PM_{2.5}$ (DEC, 2018, p. 27).

In recent years, concerns have been expressed by residents about ambient air quality in Albany's South End. In October 2019, DEC released the results of a multi-year comprehensive air study entitled *Albany South End Community Air Quality Study,* which was designed to evaluate air quality in the South End community, including at Ezra Prentice (NYSDEC, 2019, p. 2). The study began in 2017 and included a combination of stationary air quality monitors and portable instruments. The report concluded, among other things, that:

- More particulate matter is coming from motor vehicles than Port activities.
- Traffic-related air pollution (TRAP) is higher along South Pearl Street at Ezra Prentice compared to the background monitor at Third Avenue, where traffic is comparatively minimal.
- Particulate emissions from locomotives and port shipping transport are minimal compared to local traffic (NYSDEC, 2019, p. 3).

6.2 Terminal Air Emissions

The Project will significantly reduce potential VOC emissions from the Terminal. As discussed in greater detail in the accompanying Application, the Terminal currently has a total potential to emit (PTE) of 147.27 tons of VOCs. The Project will reduce the VOC PTE by approximately 45 tons per year (tpy), an approximate 30 percent reduction. As previously noted, Global is proposing to reduce the emission limit applicable to the primary marine VCU from 3 mg/L to 2 mg/L and to implement permit conditions that require negative pressure loading, which will largely eliminate fugitive emissions under most loading scenarios. Proposed upgrades to the rail VCU will decrease allowable emissions from rail loading activities from 10 mg/L to 2 mg/L by reducing the control device emission limit. Also, fugitive emissions from rail loading activities will be largely eliminated with the installation of vacuum assisted loading equipment at the rail loading rack. The Project will also decrease the total throughput limit at the Terminal by approximately 950 million gallons per year. These factors collectively will reduce potential emissions of VOCs, a precursor to the formation of ground level ozone.

As previously noted, Global proposes to install natural gas-fired boilers and oil heaters to heat biodiesel. Each boiler and heater has a maximum rated heat input capacity less than 10 million Btu/hr and is exempt from New York's air permit requirements (see 6 NYCRR § 201-3.2). The boilers are similar to equipment commonly found in a wide variety of institutional and industrial settings. The emissions from this additional equipment will not significantly impact ambient air quality. As a result, they are not significant from a SEQR perspective.

DEC requires applicants for certain air permits to determine whether emissions will have potential impacts to the surrounding community and, if so, to establish additional controls to eliminate that potential risk. Emissions associated with the Project and other emissions from the Terminal were quantified, and a protocol submitted to DEC as part of the Application to complete detailed air dispersion modeling to determine emission levels at the fence line of the Terminal. The results of this analysis will then be compared to health-based short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs) set by DEC. The SGCs protect the general public from short-term exposures of one hour and are used to assess whether ambient air impacts pose an immediate public health concern. By comparison, the AGCs are annual ambient air concentrations that protect the public health from long-term (e.g., continuous lifetime) exposure to an air contaminant. Once the protocol is approved by DEC, the detailed air dispersion model will be completed as part of the Application approval process. The analysis will require that the Terminal meet the applicable requirements.

6.2.1 Benzene

DEC has conducted a pair of studies of benzene in the South End neighborhood. The first study assessed short-term benzene emissions. The final report, entitled *Albany South End Community Air Quality Screening* found that the results for all samples collected by DEC and the community were well below the SGCs and that emissions in the area do not pose an immediate public health concern (NYSDEC, 2014, p.2). DEC also compared the results to measured concentrations from samples collected in DEC's Community Air Screening program and Air Toxics Monitoring Network. These comparisons showed that the levels in the Albany

South End community were comparable to those found in suburban and similar urban locations in New York.

More recently, DEC assessed benzene in the South End as part the 2019 Community Study, installing portable benzene monitoring equipment for two-week periods over 100 locations in and near the Port (NYSDEC, 2019, p.18). Based on the Study, DEC concluded that:

- Higher levels of benzene were not found in the residential neighborhoods outside the Port.
- Benzene detections were higher near the South Albany monitor (located near the Albany County Health Department Building at the intersection of Green and Rensselaer Streets) than at Ezra Prentice.
- Benzene detected at the South Albany permanent monitoring location was elevated when compared to measurements from other urban monitors in the State.
- Higher concentrations of benzene were detected within the Ports of Albany and Rensselaer near operations that store and transfer gasoline and petroleum products with the highest levels found across the Hudson River in the Port of Rensselaer (NYSDEC, 2019, p.4, 36).

The Terminal, to the north of the Port, is adjacent to Interstate 787 and is located in an active industrial area that is home to numerous potential sources of benzene, including other petroleum storage facilities, a major asphalt plant, and significant amounts of local traffic. The Project proposed by Global will not have a significant adverse impact on benzene emissions at or in the vicinity of the Terminal. The results of the air dispersion modeling discussed in Section 6.1 above will require that benzene concentrations at the fence line meet applicable requirements.

Moreover, as discussed in Section 2.3, as part of the Project, Global is proposing to install a vacuum enhanced control system at the rail loading rack and implement permit conditions that require negative pressure loading at the rail and marine loading racks to largely eliminate fugitive VOC emissions associated with product loading, including benzene. In addition, allowable rail rack emissions will be reduced from 10 mg/L to 2 mg/L and allowable marine loading emissions associated with the primary VCU will be reduced from 3 mg/L to 2 mg/L. These measures will help minimize both actual and potential benzene emissions. In light of these factors, the Project will not have a significant adverse impact on benzene emission levels near the Terminal.

6.3 Terminal Inspections

The Terminal is designed and operated in accordance with applicable federal, State, and company standards to ensure the safe handling and management of all types of petroleum and related products while at the Terminal and also minimize emissions. Global implements inspections and related requirements designed to detect and repair vapor leaks and fugitive emissions, including:

- **Daily Shift Inspection** –Terminal inspections are conducted twice per day. These inspections include the truck yard and truck loading rack facilities, the rail loading rack, rail unloading facilities, the marine dock loading and unloading facility, the additive storage tanks, the product pumps, and other product transfer areas. These areas are evaluated for liquid and vapor leaks using sight/sound/smell as part of the inspection.
- **Monthly Spill Prevention, Control and Countermeasures (SPCC) Inspection** – This is a comprehensive inspection of all the bulk storage tanks, associated piping, valves, flanges, and other appurtenances for leaks. Leak inspection of all equipment in gasoline service is also required under the leak detection and repair (LDAR) provisions of 40 CFR § 63.11089 (Subpart BBBBBB). In addition, Global conducts the same inspections for equipment in crude oil and ethanol service despite the fact that these products are not subject to Subpart BBBBBB.
- **Monthly Loading Rack Inspection** – This inspection is conducted on the truck loading rack as required under 40 CFR § 60.502(j) (Subpart XX). The vapor collection equipment in each bay of the truck rack loading gasoline is inspected via sight/sound/smell to ensure that it is in good condition and not leaking.
- **Quarterly Internal Floating Roof (IFR) Inspection** – Each storage tank IFR is visually inspected from the roof hatch of each tank containing an IFR in conformance with 40

CFR § 60.113b (Subpart Kb). Although Subpart Kb requires only annual inspections, Global conducts them quarterly. A meter is used to screen the air from within the tank to confirm that the IFR is operating as designed.

- **Vapor Treatment Unit Inspections** – The VRU at the truck loading rack and the VCU at the rail loading rack are inspected daily for proper operation and leaks via sight/sound/smell. In addition, Global monitors the temperature and vacuum of the VRU carbon beds. The marine VCUs are inspected prior to, and during, each vessel loading. In addition, quarterly to semiannual preventative maintenance inspections of the units are conducted by a qualified contractor to ensure proper operation. Periodic performance tests are also conducted on all vapor treatment units. During the performance tests, the vapor capture systems are tested for leaks following established EPA leak detection protocols.
- **Railcar Inspection** – Railcars are inspected in accordance with U.S. Department of Transportation (USDOT) requirements. Prior to arrival of the railcars, a safety check is completed to ensure that the railcars can be accepted into the Terminal. Following arrival of the railcars, a checklist is completed to ensure that the railcars and the railyard are secured prior to offloading. During the offloading process, inspections of each car are conducted to make sure that equipment is operating properly and there are no leaks. Upon completion of offloading, the cars are secured, and a final safety checklist is completed to ensure that each car is prepared for shipment.

These inspection measures collectively ensure that the relevant equipment is operating properly, minimizing potential emissions.

7.0 WATER QUALITY IMPACTS

The Project will not have an adverse impact on groundwater or surface water quality. As set forth in greater detail below, the Project will result in the generation of a very minor new wastewater stream associated with operation of the boilers that Global proposes to treat off-site. Otherwise, the Project will not result in any significant changes either to the Terminal's generation of wastewater/stormwater or to the infrastructure designed to contain, manage and discharge it. The Project also does not call for significant changes to the Terminal's bulk storage infrastructure and thus will not increase the potential for spills and other discharges from the Terminal. The addition of biodiesel in Tanks 30 and 33 will not introduce any significant potential contaminants which are not currently regulated under the permit.

7.1 Product Bulk Storage (EAF Section D.2.p)

The Terminal is regulated as a Major Oil Storage Facility (MOSF) pursuant to DEC License number 4-1200, which was last renewed in February 2020. The MOSF license requires Global to submit data to DEC on operating activities, implement a SPCC plan, comply with license conditions and State Petroleum Bulk Storage (PBS) regulations, and report releases to DEC. The PBS regulations require the Terminal to construct petroleum storage facilities in accordance with industry standards and minimize the potential for spills and the associated impacts to ground and surface water. In addition, the regulations require inspections for purposes of minimizing the potential for leaks. The MOSF license has conditions that require monitoring of groundwater through routine groundwater sampling and requires spill containment areas to prevent discharges to groundwater and surface water. The secondary containment areas are required to be routinely sampled and certified that they meet the regulations as discussed below. DEC routinely inspects the Terminal to ensure it is in compliance with its MOSF and PBS requirements. These measures are collectively designed to minimize the potential impact of the Terminal on ground and surface water.

There are five types of operational areas at the Terminal: (1) tank dike areas, (2) loading and unloading racks, (3) oil transfer areas (not defined as racks under EPA regulations), (4) the marine dock area, and (5) other areas where the potential exists for an oil spill (piping runs, etc). Spills are prevented from reaching groundwater or surface water through the secondary containment areas which surround the tanks. The dikes are lined with a Geosynthetic Clay Liner (GCL) or HDPE liners (liners). The liners are sampled/tested and certified every five (5) years. The most recent certification was in 2019 and followed replacement of the liner system. Periodic inspections also verify that the containment has the appropriate volume and permeability.

There are two loading racks (rail and truck) at the Terminal that are regulated by the EPA as non-transportation-related and therefore subject to SPCC regulations. These loading racks are equipped with spill containment tanks and transfer systems which provide containment for the largest cargo compartment potentially served at each rack. Also, there are various unloading/transfer areas within the Terminal that are required to meet EPA's general secondary containment requirements set forth in the SPCC regulations. These include the rail offloading area, and areas for offloading additives. These areas meet the general secondary containment requirements via containment areas, terminal drainage, drip pans and/or readily available spill response materials.

The majority of piping at the non-transportation-related (EPA-regulated) portion of the Terminal is contained within tank secondary containment dikes or areas equipped with other secondary containment.

The piping associated with the transportation-related (U.S. Coast Guard regulated) portion of the Terminal runs from the first valve within secondary containment to the marine dock. It is recognized under the regulations that containment for marine dock piping is not generally feasible, and therefore, the regulations require annual hydrostatic testing of the piping at 150% of its operating pressure. Global conducts this annual testing in conformance with the regulations.

The Project will not call for any changes to the Terminal that are likely to significantly impact its potential to discharge oil or other products and thus adversely affect ground or surface water. The Project will not increase the Terminal's storage capacity or otherwise require changes that could increase the potential for spills and other discharges.

7.2 Wastewater and Stormwater Discharges (EAF Section D.2.d.iv & D.2.e)

The Terminal currently discharges stormwater and hydrostatic test water pursuant a State Pollutant Discharge Elimination System (SPDES) Permit (Permit No. NY 0021016). Under the SPDES permit, stormwater containing oil and other contaminants is collected at the Terminal for treatment. Stormwater is treated through an oil/water separator and discharged via internal Outfall 02A while hydrostatic test water is discharged via internal Outfall 02B. Outfall 02A and Outfall 02B combine and discharge to the Hudson River at Outfall 002. As required by the SPDES permit, discharges from the outfalls are monitored and the results reported to DEC on monthly Discharge Monitoring Reports (DMRs). Stormwater collected from the loading racks and other transfer areas is collected and stored in Tank 130 at the Terminal. The stormwater in Tank 130 is either treated on site and discharged via Outfall 002 or transported off site for reclamation.

Stormwater from the rail offloading area is discharged under the SPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (GP-0-17-004). Stormwater is generally discharged to an infiltration basin, although it may be directed to the municipal storm sewer system during extreme weather events. Two of the rail spurs in the rail offload area are bermed and drain to a drainage swale which flows north to a cluster of three interconnected catch basins (Outfall 004), which drain to an infiltration pond. The other four rail spurs are in a separate bermed area which sheet flows to three other catch basins (Outfalls 001, 002, and 003). These catch basins have valves which remain closed during normal operating conditions to provide containment for the rail offloading system. Once the valves are opened, these catch basins discharge to the cluster of three catch basins identified above as Outfall 004. Overflow from the drainage system is directed by an engineered spillway into the City of Albany Municipal System. Quarterly visual sampling and semi-annual benchmark sampling are conducted and annual reports are submitted to DEC.

The only change to wastewater associated with the Project is the potential generation of small quantities of water associated with operation of the new boilers. This water will be collected in a small tank and shipped offsite for treatment. Otherwise, the Project will not generate new wastewater streams or introduce new contaminants, nor will it change how wastewater and stormwater are managed on-site. As a result, the Project will not necessitate any change to the Terminal's SPDES permit. From a SEQR perspective, the Project will not have any impact on the Terminal's wastewater or stormwater discharges.

Installation of the Project will not disturb more than one acre of land. As a result, the Applicant will not be required to seek coverage under DEC's SPDES General Permit for Stormwater Discharges from Construction Activity.

No wetlands, streams, or other surface waters will be impacted by the Project. The Hudson River is directly east of the Terminal and will not be impacted by the Project.

8.0 ARCHEOLOGICAL / NATURAL RESOURCE IMPACTS (EAF SECTION E.2)

The Project will not cause "the impairment of the character or quality of important historical, archeological, architectural, or aesthetic resources or of existing community or neighborhood character" and will not have significant adverse impacts to natural resources" (6 NYCRR § 617.7(c)(1)(ii), (v)). The Project will be located at an existing industrial facility that has been in continuous operation since the 1920s. Ground disturbances associated with the Project will occur in areas that have been previously disturbed. Moreover, the extent of ground disturbance required for the Project will be substantially less than one acre and will involve only installation of various pipe supports, concrete pads, and other minor ground disturbance impacts. The new boilers and heaters will be installed inside existing buildings.

In June of 2009, a letter was sent to the New York State Historical Preservation Office (SHPO) addressing an earlier project and requesting a review of the proposed activity in order to determine whether the project would have the potential to result in a significant impact to recognized historical resources, or disturb sites that are archeologically sensitive. The project to improve access to the Terminal from CP Rail's Kenwood Rail Yard included adding service tracks and storage for tank cars, and a new aboveground pipeline to facilitate the transfer of fuel from the railyard to two existing storage tanks. Using SHPO's online mapper, no historical resources were found within or immediately adjacent to the proposed improvement area, or the facility as a whole. SHPO reviewed the request and stated that the proposed work would have no adverse effect on historical or cultural resources listed on the National Register of Historical Places.

The Terminal location has been an active industrial site for at least 100 years. As a result, there are few natural resources at the site of the Project. According to the DEC Environmental Resource Mapper, the only location that might be considered “natural habitat” at the Terminal location is the river bank. However, no ground disturbance or other activities are proposed along the river bank as part of the Project. Otherwise, there are no natural habitats—defined as an ecological or environmental area where a specific species lives—within the Terminal site. There will be no impacts to natural resources from the Project, i.e., the Project will not cause “the removal or destruction of large quantities of vegetation or fauna; substantial interference with the movement of any resident or migratory fish or wildlife species; impacts on a significant habitat area; substantial adverse impacts on a threatened or endangered species of animal or plant, or the habitat of such a species; or other significant adverse impacts to natural resources” (6 NYCRR § 617.7(c)(1)(ii)). Also, there are no critical environmental areas located on or adjacent to the Terminal site. *See* 6 NYCRR § 617.7(c)(1)(iii).

9.0 ODOR (EAF SECTION D.2.o)

The Project will not result in adverse off-site odor impacts. A baseline study conducted on behalf of Global concluded that any odors associated with the Terminal are well below typical objectionable levels. Going forward, the Project calls for significantly reducing allowable crude oil throughput at the Terminal and installing additional air emission controls—changes that will reduce emissions of potential odor-causing VOCs and other pollutants. The addition of heated biofuels will not affect the odor potential at the Terminal.

In preparation for this Project, Global retained Odor Science & Engineering, Inc. to complete an odor study at the Terminal and the surrounding area. A copy of the odor study is included as Attachment F. The study concluded that odors associated with the Terminal are well below typical objectionable levels.

The objective of the ambient odor monitoring study was to provide an odor baseline for the Terminal by determining the distance at which any Terminal-related odors could be detected off-site as well as documenting the odor impact of other sources in the surrounding area. The odor monitoring was conducted over a 5-day period. Four (4) on-site and twelve (12) off-site odor surveys were conducted at various times of the day and night to document the full range of diurnal meteorological patterns. During the surveys, the location, odor concentration, intensity, character and likely source of any odor detected were documented along with the meteorological conditions. The study concluded that any odors potentially associated with the Terminal are well below typical objectionable levels. Any odors attributable to the Terminal site were both infrequent and at very low levels that would not typically be the cause of odor complaints. The background odors in the general Port of Albany industrial area consisted of more frequently detectable and higher intensity odors from local industrial sources other than Global.

The Project calls for significantly reducing allowable crude oil throughput at the Terminal. Since crude oil is a potential source of odor, the reduction in crude oil throughput should reduce potential odor impacts. Also, Global operates its marine loading and truck loading operations under negative pressure (vacuum) and as part of the Project will install equipment to load under negative pressure at the rail loading rack. These operational practices should further reduce emissions of potential odor-causing substances.

As noted above, the Project calls for authorizing the heating of biodiesel to facilitate transfer operations. Biodiesel has been described as having a mild petroleum distillate odor or as having a “mild oily or animal fat odor” (USDOE, 2016, App. A). Biodiesel odors, if any, are not expected to extend outside the Terminal. Accordingly, the Project will not contribute to adverse odor impacts.

Finally, Global has an extensive and on-going inspection program in place to detect leaks and odors, including twice daily shift inspections of the Terminal, daily inspections of the Terminal’s

VCUs and VRU, and USDOT-mandated inspections prior to railcar offloading. In recent years, the Terminal has been inspected on many dozens of occasions by federal, State and/or local agencies, including DEC, EPA, USDOT and the U.S. Coast Guard, among others. Odor impacts have not been identified as a concern during these inspections.

For the reasons set forth above, the Project will not cause adverse odor-related impacts at the Terminal.

10.0 NOISE (EAF SECTION D.2.m)

The Project will not generate noise that will affect offsite receptors. Existing noise from the Terminal originates primarily from the movement of railcars within the Terminal as well as various on-site equipment, including the VCUs. This noise does not currently create an off-site impact. As previously noted, although the Project calls for the installation of natural gas-fired boilers and heaters, this new equipment will be located within building structures and will not be audible outside the Terminal.

The Terminal is located adjacent to the industrial Port of Albany, which is the site of numerous active rail lines and yards as well as various significant industrial activities. The Terminal also is located near Interstate 787, a high traffic density highway. These activities contribute significantly to noise in the vicinity of the Terminal.

The only changes to the Terminal associated with the Project with the potential to impact noise levels are the installation of natural gas-fired boilers and heaters to be located inside buildings. Owing to the nature of the equipment and their location, they are not expected to generate noise that is audible outside the Terminal fence line. Global nevertheless retained JMT, a noise consultant, to determine baseline noise conditions in accordance with DEC Program Policy *Assessing and Mitigating Noise Impacts*. A copy of the noise study is found in Attachment G.

As part of the noise study, average ambient sound levels were recorded and were found to be consistent with urban and commercial areas per the Federal Highway Administration document, *Techniques for Reviewing Noise Analyses and Associated Noise Reports*. The measured noise levels were also consistent with residential areas proximal to highways.

In general, while there was some variability, average ambient sound levels recorded at the Ezra Prentice Homes and within the Terminal were effectively identical. Noise values observed at the core of Global's facility operation were below noise values observed at Ezra Prentice Homes for day, night, and combined monitoring periods. The results support anecdotal observations from field staff completing the noise study that highway traffic is the predominant source of environmental sound in the area, including at Ezra Prentice Homes. Furthermore, the study concluded based on observed noise values that the Terminal has little to no impact on surrounding sound levels.

The additional sound from the new equipment proposed to be installed indoors as part of the Project will not change the conclusion that the Terminal has little or no impact on surrounding sound levels.

The major source of noise affecting the Ezra Prentice Homes originates from the Kenwood Rail Yard located immediate to the east of the residences. In the past, members of the community have expressed concern to DEC about the noise associated with the movement of railcars in the Kenwood Rail Yard. However, neither Global nor State and local authorities have authority over the movement of railcars in the Kenwood Rail Yard. Railroad transportation activities are regulated solely by the federal government pursuant to the U.S. Constitution as "interstate commerce" and specific federal statutory provisions preempt local and state control over these railcar movements. As articulated in a 2014 Surface Transportation Board (STB) decision:

> The Interstate Commerce Act (Act) is "among the most pervasive and comprehensive of federal regulatory schemes." Chi & N.W. Transp. Co. v. Kalo Brick & Tile Co., 450 U.S. 311, 318 (1981). The Act, as revised by the ICC Termination Act of 1995, Pub. L. No. 104-88, 109 Stat. 803, expressly provides that the jurisdiction of

> the Board over "transportation by rail carriers" is "exclusive." 49 U.S.C. § 10501(b). The statute defines "transportation" expansively to encompass any property, facility, structure or equipment "related to the movement of passengers or property, or both, by rail, regardless of ownership or an agreement concerning use." 49 U.S.C. § 10102(9). Moreover, "railroad" is defined broadly to include a switch, spur, track, terminal, terminal facility, freight depot, yard and ground, used or necessary for transportation. 49 U.S.C. § 10102(6). Section 10501(b) expressly provides that "the remedies provided under [49 U.S.C. §§ 10101-11908] with respect to regulation of rail transportation are exclusive and preempt the remedies provided under Federal or State law." Thus, § 10501(b) is intended to prevent a patchwork of local regulation from unreasonably interfering with interstate commerce. See, e.g., Norfolk S. Ry.— Pet. For Declaratory Order, FD 35701, slip. op. at 6 & n.14 (STB served Nov. 4, 2013); H.R. Rep. No. 104-311, at 95-96 (1995).

Soo Line Railroad Co. Pet. for Declaratory Order, FD 35850, 2014 WL 7330097, at *3 (STB served Dec. 23, 2014).

These broad preemption principles limit claims against railroads for noise and other nuisance impacts associated with railroad operations. In a 2013 decision, the STB issued a declaratory order finding that a lawsuit by property owners for damages allegedly caused by noise, vibration and particulates from trains operating on the defendant's rail line was preempted by federal law. The STB noted that the alleged harms were the direct result of the defendant's railroad operations and that:

> Subjecting [the railroad] to claims based on the alleged byproducts (such as noise, vibration and various discharges) of conventional and routine rail operations on the rail carrier's own property—which could be invoked by owners of property near operating rail lines anywhere—would unduly burden interstate commerce and significantly hinder [the railroad's] ability to function as a rail carrier, amounting to impermissible state regulation of [its] operations.

Norfolk Southern Railway Co., FD 35701, 2013 WL 5891582, at *3 (STB served Nov. 4, 2013) (citations omitted).

Consistent with these basic principles, authority for regulating noise associated with train operations rests exclusively with the Federal Railroad Administration (FRA), which has developed an elaborate network of regulations to address noise issues. Of perhaps greatest relevance, the FRA has issued the railroad noise emission compliance regulations, set forth at 49 CFR Part 210, that set noise standards for various types of equipment and operations.[9] Responsibility for implementing and enforcing these noise standards rests with the railroads and FRA, respectively.

Likewise, horn blasts from locomotives also are governed by FRA regulations. The use of railroad horns at public highway-rail grade crossings is regulated under 49 CFR Part 222. The use of railroad horns for purposes other than crossings (including in rail yards) is governed by 49 CFR § 214.339, which requires railroads to develop and comply with written safety procedures addressing the use of horns or bells for trains and locomotives approaching workers. *See* 49 CFR Part 214, subpart C (roadway worker protection). In the present case, because the rail yards at and near the Port operate 24 hours per day, train horns may sound during the night consistent with FRA rules.

A brief overview of the logistics associated with managing the trains received at the rail offload area illustrates the strict limits of Global's authority to mitigate noise. In scheduling trains, CP Rail must take account of numerous factors, including other freight trains using the rail lines, Amtrak schedules (since passenger rail takes precedence over freight), and track work and

[9] Part 210 applies "to the total sound emitted by moving railcars and locomotives . . . active retarders, switcher locomotives, car coupling operations, and load cell test stands, operated by a railroad" (49 CFR § 210.3(a)). Under Part 210, railroads must comply with railroad noise emission standards set by EPA in 40 CFR Part 201 for all types of equipment. Equipment that does not meet the EPA standards is considered "noise defective." Railroads using noise defective equipment must correct the noise defect or remove the equipment from service. Similarly, car coupling activities that exceed the EPA noise standards must be modified to bring them within prescribed noise limits (49 CFR § 210.5, 210.7.)

inspections. These restrictions limit options for avoiding night-time arrivals and minimizing nighttime noise.

Upon arrival at the Terminal, CP Rail remains responsible for moving the train within the rail offload area, including the coupling and uncoupling of cars. Global is responsible only for offloading product from the train into its tanks. From a practical perspective, however, Global has a strong incentive to establish offloading procedures that minimize the movement of railcars within the yard, and thus the amount of noise. Unnecessary movement increases the time and expense associated with the offloading process. Accordingly, Global is constantly reviewing its procedures for managing the receipt and offloading of railcars with CP Rail to reduce movement and, by extension, noise within the portion of the Kenwood Rail Yard leased by Global. Consistent with this effort, Global is proposing to increase the number of loading arms at the rail loading rack, a change that will enable the Terminal to load railcars without interim movements, reducing noise levels associated with this activity. Global also has worked with CP Rail to allow trains to be brought directly into the Terminal and has installed equipment that allows CP Rail to connect and test outbound railcars within the Terminal site. This change has limited the use of the rail spur located immediately behind Ezra Prentice to minimize the potential noise and other impacts to residents. However, Global cannot compel CP Rail to stage railcars in a particular location.

11.0 FIRE AND EMERGENCY RESPONSE

The Project will not affect the risk of fire at the Terminal. As set forth in greater detail below, the Terminal is already designed to handle all types of combustible and flammable fuels. The Terminal has been constructed and is operating in accordance with extensive federal, State and local regulations, applicable codes and internal operating standards. These standards, which cover all types of flammable and combustible liquids managed at the Terminal, address facility design, fire suppression and response equipment, inspections and training, among other topics.

The characteristics and fire potential of the products handled at the Terminal are incorporated into construction standards, operational requirements and fire safety standards. In particular, the National Fire Protection Association (NFPA) sets standards and codes intended to minimize the possibility and effects of fire and other risks. NFPA Code 30: Flammable and Combustible Liquids Code, provides safeguards to reduce the hazards associated with the storage, handling, and use of flammable and combustible liquids. Topics covered in NFPA 30 include fire and explosion prevention and risk control, storage of liquids in containers, storage of liquids in tanks, piping systems, processing facilities, bulk loading and unloading, and marine docks.

As set forth in greater detail below, the proposal to install equipment to indirectly heat certain comparatively viscous biodiesel to facilitate transfer will not increase the risk of fire. Similar to a radiator, the heating involves passing steam or hot oil through pipes to heat the railcars and tanks used to store biodiesel. This indirect heating process, which is commonly employed in the management of biodiesel, does not pose a significant fire hazard risk. More generally, the proposed changes to the Terminal will not impact either the risk of fire or the Terminal's emergency response needs.[10]

11.1 Fire Explosion Measures at the Terminal

The Project does not require implementation of any new or modified fire protection measures. Previously accepted and approved procedures will address any new biodiesel products introduced at the Terminal.

NFPA 30 categorizes liquids into three classes based on the liquid's initial boiling point or flashpoint: Flammable liquids (liquids with a flashpoint below 100 degrees Fahrenheit) are categorized as Class I liquids while combustible liquids (liquids with a flashpoint at or above 100 degrees Fahrenheit) are categorized as Class II or Class III liquids. The refined products

[10] Note that the long-form EAF does not specifically require an assessment of the fire and explosion impacts of projects undergoing SEQR review. The Applicant has included this information to provide a thorough assessment of the potential impact of the Project on the surrounding community.

traditionally handled at the Terminal consist of Class I, II and III flammable and combustible liquids. Biodiesel is typically classified as a non-combustible liquid having a flashpoint above 200 degrees Fahrenheit.

Consistent with the applicable NFPA requirements, the Terminal is equipped with an extensive collection of fire suppression and response equipment. Foam suppression systems have been installed at the truck loading rack, the dock/east tank farm area and the west tank farm. According to Safety Data Sheets, the foams stored are not manufactured using perfluorooctane sulfonic acid (PFOS). In addition, two self-contained mobile foam trailers equipped with hoses, nozzles and monitors are available for fire response within the rail offload area. One is at the Terminal and the other is housed at the South Pearl Street Fire House for rapid deployment, if required. Each trailer is equipped with 500 gallons of foam, which can be resupplied without interruption using the resources at the Terminal. Global also has an additional 6,400 gallons of foam stored and available on-site as well as three additional self-contained mobile foam trailers holding an additional 1,500 gallons of foam located in Newburgh, New York, which are available for immediate deployment. The rail facility also has an 8” looped fire main with associated hydrants.

In addition to supplying the Albany Fire Department with a foam trailer, Global has donated three fire monitors for general fire department use. Global also made a significant contribution which allowed the Albany Fire Department to procure a spill response boat with firefighting capabilities.

In 2015, Global conducted a study of fire response and fire suppression resources under its MOSF license and met with the Albany Fire Department. The resulting report concluded that the Terminal had adequate fire-fighting equipment to provide protection for the rail loading and unloading areas, the marine dock, and other locations throughout the Terminal. In addition, the report found that the Terminal had sufficient support capabilities from outside emergency services, including the Albany Fire Department, County emergency response agencies and Global’s contracted fire response organization, Williams Fire and Control.

Terminal fire systems are operated and tested annually by an outside contractor with expertise in NFPA 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." This includes testing the thermal detectors at the truck loading rack, confirming water flow volumes for the various suppression systems, and evaluating the injection ratio of the foam concentrate to make sure it meets manufacturer specifications. Representative samples of the foam concentrate are also submitted to the foam manufacturer on an annual basis to ensure that the foam meets the manufacturer's specifications. The fire systems are equipped with generator backup to ensure operation in the event of a loss of power. The generators are tested on a weekly basis.

In addition to the annual inspections, the rack and foam system fire pumps are run on a weekly basis to ensure proper operation in the event of an incident. The foam trailers and foam houses are inspected monthly. The foam trailer housed at the South Pearl Street Fire Station is included in the inspection.

Fire extinguishers are provided near each product loading/unloading area for employee use. These extinguishers are distributed, inspected, and tested pursuant to applicable Occupational Safety and Health Administration (OSHA) and NFPA requirements.

Global has an emergency evacuation plan for the Terminal included in the Emergency Response Action Plan. The primary purpose of the evacuation plan is to provide instruction for evacuation of the Terminal and procedures to account for employees, contractors and visitors at the site. The Emergency Response Action Plan contains procedures for initial response and notification of federal, State and local authorities. Any additional evacuation that may be implemented beyond the Terminal would be directed by the Albany Fire Department as incident commander. Global would coordinate and cooperate with the Fire Department as needed. Global routinely communicates and trains with the local Fire Department, and officials are provided access to the Terminal to understand its operations and train.

Emergency events that have a potential impact to the community need to be managed and communicated in a coordinated manner. Depending on the nature of the incident, Global would follow procedures and training consistent with the Incident Command System to involve local emergency services, which would include local fire and police departments and the Local Emergency Planning Commission.

The plan to heat certain railcars as well as Tanks 30 and 33 to facilitate the transfer of biodiesel does not significantly increase the risk of fire. Biodiesel has a comparatively low Fire Hazard rating from the NFPA compared to other products stored at the Terminal. Moreover, the biodiesel railcars, pipelines and tanks proposed to be heated are specially designed with internal or external jacketed heating coils. As the steam or hot oil circulates through the heating coils, it indirectly heats the biodiesel to a maximum temperature of only 120° Fahrenheit—or just enough to allow the product to be pumped. This type of heating system is commonly used whenever heat is needed to handle viscous fluids and is similar to systems currently employed at other facilities in the Port. The other components of the Project also will not affect the fire risk at the Terminal or Global’s fire response.

11.2 Fire/Explosion Measures During Transport

The Federal Railroad Safety Act (FRSA) empowers the U.S. Secretary of Transportation, through the FRA, to “prescribe regulations and issue orders for every area of railroad safety” (49 USC § 20103(a)). To ensure nationwide consistency in railroad regulation, the FRSA provides that “[l]aws, regulations, and orders related to railroad safety and . . . security shall be nationally uniform to the extent practicable” (49 USC § 20106(a)(1)). It goes on to specifically preempt states from adopting state regulations covering any subject matter covered by a USDOT regulation with certain limited exceptions (49 USC § 20106(a)(2)). Under this provision, where USDOT has adopted regulations addressing a particular aspect of train safety, states are generally preempted from imposing their own, potentially conflicting regulations.

The Pipeline and Hazardous Materials Safety Administration (PHMSA), a USDOT agency, regulates the characterization of hazardous materials during shipment by rail, vessel and truck. The Hazardous Material Regulations (HMR) require individuals offering materials for transport to classify and characterize the material to determine proper packaging, labeling and other requirements. *See* 49 CFR Parts 171-177. The Terminal must classify and characterize oil consistent with these requirements.

11.3 Fire Training/Response

The Project does not require any modifications or additional measures to be implemented for fire training and response. Previously accepted and approved fire suppression systems and response training will address the additional biodiesel being introduced at the Terminal as part of the Project.

Global conducts fire training with the Albany Fire Department. The fire department training includes familiarization with each of the fire suppression systems at or near the Terminal, including the portable foam trailers stored at the Terminal and at the South Pearl Street Fire Station, the truck loading rack foam suppression system, the dock/east tank farm foam suppression system, and the west tank farm foam suppression system.

In addition, Global employees are provided with training on fire prevention and response practices on a regular basis. The training includes the controls used at the Terminal to prevent the occurrence of fires as well as work practices. Routine inspections are conducted at the Terminal to identify and correct abnormal conditions consistent with this training. Refresher training is provided on a scheduled basis or as needed depending on changes in operations or products handled.

To address the unlikely event of a fire, employees are trained on emergency notification and response practices in order to ensure they are familiar with the proper steps to implement if a fire is discovered, including summoning appropriate responders. These response practices are addressed through regular spill response training, reinforced during safety meetings, and addressed during emergency response drills. Training, meetings and drills address responses specific to potential fire scenarios at the Terminal, response equipment and local response capabilities.

Annually, employees are provided with initial (incipient) stage fire extinguisher training that addresses the appropriate responses to small fires that can be extinguished quickly using available equipment on-site. Employees also receive periodic fire prevention training consistent with OSHA and NFPA standards so they are knowledgeable regarding the risks of flammable and combustible materials and how to effectively manage those risks.

12.0 CLIMATE CHANGE AND SEA LEVEL RISE

As set forth in greater detail below, greenhouse gas (GHG) emissions from the Terminal under the current Title V air permit are comparatively low, consisting primarily of small quantities of carbon dioxide (CO_2) from combustion equipment at the Terminal. Although the Project calls for the installation of additional combustion equipment, the additional GHG emissions associated with this new equipment are minor and from exempt sources. Overall, the Project will not have a significant climate change impact.

12.1 GHG Emissions (EAF Section D.2.f, g, & h)

12.1.1 DEC Regulation and Guidance Relating to GHGs

Available regulations and guidance on addressing GHGs under SEQR is limited. To date, the only substantive regulations DEC has adopted to address emissions of pollutants that contribute to climate change apply to fossil fuel-fired power plants. These regulations include 6 NYCRR Part 251 (establishing CO_2 emission limits for major new or modified fossil fuel-fired electric generating facilities) and 6 NYCRR Part 242 (establishing a cap-and-trade program for power plant CO_2 emissions for purposes of implementing the Regional Greenhouse Gas Initiative). However, these regulations address only emissions of CO_2 from power plants. Also, they do not require regulated entities to limit indirect GHG emissions in New York State, let alone attempt to directly limit or otherwise regulate GHG emitting activities outside the State's borders.

Several years ago, DEC modified its EAF form to require information about emissions of specific GHGs, including methane, CO_2 and nitrous oxide (N_2O), which are byproducts of fuel combustion.[11] More recently, the SEQR regulations were revised to require the Draft Environmental Impact Statement (EIS) (if required) to identify and discuss "measures to avoid or reduce both an action's impact on climate change and associated impacts due to the effects of climate change such as sea level rise and flooding" where "they are relevant and significant" (6 NYCRR § 617.9(b)(5)(iii)(i)).

DEC regulations and policy do not compel applicants to engage in a lifecycle climate change analysis—which considers GHG emissions associated with the particular fuel from the point of extraction/production to the point of combustion. This conclusion is confirmed by DEC's full EAF, which seeks general information about energy use and GHG emissions but does not request detailed "lifecycle" data.

12.1.2 Direct Terminal GHG Emissions

Detailed information about GHG emissions from the Terminal and the Project can be found in the Application. The primary GHG emitted by equipment at the Terminal is CO_2, which is a byproduct of fossil fuel combustion from the Terminal's existing VCUs and from minor engines and emergency generators that are exempt from permitting under 6 NYCRR § 201-3.2(c).

The maximum CO_2 emissions from operating the Terminal under its currently Title V permit throughput limits is approximately 17,900 tpy. As part of the Project, Global is proposing to install several natural gas-fired boilers and heaters to heat biodiesel. Potential CO_2 emissions from this new equipment are estimated at 25,560 tpy, while actual emissions are expected to be significantly lower.

---

[11] The following six substances are recognized by DEC and others as GHGs: CO_2, methane (CH_4), N_2O, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Actual operation of the boilers and heaters are expected to be approximately 25% of the total potential operating capacity. They are not expected to operate as often in the summer as in the colder months.[12] This results in expected actual increase in GHG emissions of approximately 6400 tpy.

The Project will not result in a significant amount of GHG emissions and will not have a significant adverse impact on climate change.

12.1.3 Indirect Impacts

The Terminal provides a connection between fuel producers and refiners and their customers. To date, DEC has not established any regulation that would attribute GHG emissions associated with the production of a particular product to the middleman responsible for transferring that product in commerce from the producer to the consumer. Accordingly, no further analysis of these off-site indirect impacts is required.

12.1.4 Implications of CLCPA

In 2019, New York enacted the Climate Leadership and Community Protection Act (CLCPA), which requires reductions in statewide GHG emissions to 60% of 1990 levels by 2030 and 15% of 1990 levels by 2050. The CLCPA—which is codified primarily at N.Y. Environmental Conservation Law (ECL) Art. 75—calls for establishing a Climate Action Council, which will be responsible for preparing a scoping plan containing recommendations on regulations and other

[12] Further evidence that petroleum terminals generally are not significant sources of GHG emissions is provided by other GHG programs. For example, petroleum terminals are not included on the list of sources required to submit annual reports of their GHG emissions under 40 CFR Part 98, EPA's GHG reporting rule. This reflects EPA's conclusion that terminals are not a significant source of GHG emissions. Under EPA's Prevention of Significant Deterioration (PSD) program—the attainment equivalent of the nonattainment NSR program—EPA adopted special tailored applicability thresholds for new and modified sources of GHGs after concluding that the statutory thresholds for other pollutants were so low that they would result in an unmanageable expansion of the PSD program if applied to GHGs. 75 Fed. Reg. 31514 (June 3, 2010). Although the rule was eventually vacated by the U.S. Supreme Court, it provides a useful point of comparison for purposes of assessing the significance of GHG emissions. The so-called "GHG tailoring rule" established a 100,000 tpy major source threshold for GHG emissions measured in CO_2 equivalent, while the significant modification threshold was 75,000 tpy CO_2 equivalent.

state measures to achieve necessary GHG reductions. By January 2024 (the law's fourth anniversary), DEC must adopt regulations to ensure compliance with the statewide emission reduction limits and assist other state agencies in developing their own regulations, as necessary. Section 7(2) of the CLCPA requires all state agencies to consider whether permitting, licensing, and other administrative approvals and decisions are inconsistent with or will interfere with the attainment of the statewide GHG emission reduction mandates established in ECL Article 75.

The enactment of the CLCPA should not significantly affect the determinations required to be made under SEQR for the Project. As a preliminary matter, the data establishes that the Terminal is not a significant source of GHG emissions nor will it become one following implementation of the Project. Given the relatively minor GHG emissions associated with the Project, granting the requested permit modification will not interfere with attainment of the CLCPA's GHG reduction mandate and thus does not implicate Section 7.2 of the Act. Moreover, specific regulatory and other requirements under the CLCPA are at least four years away. Under these circumstances, the CLCPA does not affect the conclusion that the Project will not have a significant impact with respect to climate change.

12.2 Sea Level Rise

The Project does not call for the installation of extensive additional equipment at the Terminal. As previously discussed, Global is proposing to several small, exempt boilers and heaters to manage biodiesel, and additional loading positions at the truck and rail racks. The Project thus will not significantly increase the risks to the Terminal associated with climate change, including sea level rise. Moreover, as set forth below, Global is in the process of assessing the Terminal as part of a company-wide review of climate resiliency concerns. The results of that review may lead to changes at the Terminal to address climate resiliency issues.

In 2014, the NYS Legislature enacted the Community Risk and Resiliency Act (CRRA) to ensure that decisions regarding certain State permits and expenditures consider climate risk, including sea level rise. The CRRA requires DEC to: adopt regulations establishing sea level rise projections; identify programs in which applicants, DEC and other agencies must consider climate risk, including the impact of sea level rise; and requires DEC and DOS to issue guidance on implementing the CRRA. In 2017, DEC adopted a regulation, set forth at 6 NYCRR Part 490, containing a range of five sea level rise projections (low, low-medium, medium, high-medium, and high) for three regions of the State (Mid-Hudson, New York City/Lower Hudson Region, and Long Island Region).

Part 490 does not impose obligations on facilities. *See* DEC, 6 NYCRR Part 490 Regulatory Impact Statement ("There is no compliance schedule required by the establishment of Part 490 because the rule does not impose any compliance obligations on any entity"). Although the CRRA required DEC and DOS to issue guidance on implementation by January 1, 2017, no guidance has been made available for public comment, let alone issued. Applicants for permits or funding are not be required to consider Part 490 sea level rise projections until DEC and DOS issue guidance explaining how sea level impacts are to be addressed. Finally, the list of State permits covered by the CRRA does not include air permits. Thus, even if the CRRA had been fully implemented, it would not have applied to the permit currently under review.

Based on the most recent Federal Emergency Management Agency (FEMA) map of the Terminal site (Map No. 36001CO194D, Effective March 16, 2015), the majority of the Terminal site is located within the 100-year floodplain of the Hudson River. For purposes of the CRRA, the City of Albany (including the Terminal location) is in the Mid-Hudson Region.

As previously noted, the Project does not include the construction of new structures or installation of significant amounts of new equipment. Moreover, the Project does not include the placement of fill or other encroachments into floodways or floodplains that could raise base flood elevations or otherwise impact the potential path of floodwaters. As a result, no significant impacts relating to flooding (including potential sea level rise) are expected from the Project.

Despite the lack of anticipated flooding/sea level rise-related impacts associated with the Project, Global nevertheless takes its obligations to address climate resiliency seriously.

Planning and response procedures for floods and other natural disasters are incorporated into the Terminal's spill prevention and response plans. These plans are reviewed periodically and response procedures are updated based on FEMA flood projections and sea level rise projections associated with climate change. This evaluation process helps ensure that the Terminal is not adversely affected by sea level rise attributable to climate change.

13.0 VISUAL ANALYSIS[13]

As discussed in Section 2.1 above, the Terminal is located in an existing industrial area along the Hudson River adjacent to the existing Port of Albany, a major industrial/commercial facility. The Terminal has been in its current location for almost a century. In fact, the Terminal has fewer storage tanks than were historically located on the property.

The only construction associated with the Project that could potentially affect the Facility from a visual perspective is the installation of additional loading positions at the truck rack and the rail rack and other minor appurtenances. (The new boilers and heaters will be installed inside existing structures and so will not have a visual impact.) A visual analysis was conducted of the truck rack expansion and the rail rack expansion. Photographs of the existing truck rack area and rail rack area from three (3) different angles each are included as Attachment H. As seen from the images, the nature and character of the site is not impacted, and views of the area are not substantially affected. A rendering of the additional bays at the truck loading rack is also included in Attachment H.

---

[13] With respect to visual impacts, the EAF inquires whether "the project site is within five miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource?" This question reflects the fact that not all visual impacts are required to be assessed for SEQR purposes. As set forth in visual impacts must only be assessed when an action is proposed within the viewshed of a designated aesthetic resource such as a state park or national wildlife refuge. However, even if a project will be located within the viewshed of a designated historic resource, its significance will depend in large part on whether the area was designated for its aesthetic value. For further details, see DEC's Program Policy DEP-00-2, *Assessing and Mitigation Visual and Aesthetic Impacts* at https://www.dec.ny.gov/permits/115147.html. In this case, the Terminal is not located within five miles of any officially designated and publicly accessible federal, state or local scenic or aesthetic resource and so does not require a visual impact assessment. Nevertheless, Global has conducted an assessment of the impact of the Project from a visual perspective.

In the past, residents of Ezra Prentice Homes have expressed concerns about the visual presence of railcars located in Kenwood Yard immediately behind the homes after cars have been emptied. As a preliminary matter, the rail siding at issue, and Kenwood Yard as a whole, was in place well before Ezra Prentice was constructed by the Albany Housing Authority. More importantly, Global has no control over where CP Rail stages its railcars. Railcars parked on the Kenwood Yard siding are considered to be "in transit" and are staged based on CP Rail's own logistical and operational needs. As previously discussed in the Section 10.0 relating to noise, Global—despite lacking any authority to insist on railway operation changes—has reached out to CP Rail and asked them to minimize use of the rail spur immediately behind Ezra Prentice. Global also has provided additional infrastructure in the rail offload area located at the Terminal that allows CP Rail to build outgoing trains in the offload area rather than pulling the cars to the staging area near Ezra Prentice. In addition, when possible, CP Rail delivers railcars directly into the Global railcar area, rather than staging the railcars near Ezra Prentice. These voluntary measures have been implemented to reduce the visual impact of staged railcars on the residents of Ezra Prentice. As previously noted, however, CP Rail is ultimately responsible for determining how railcars will be staged.

14.0 DEC ENVIRONMENTAL JUSTICE POLICY

Global has taken—and will continue to take—steps to ensure that the members of the South End community and their representatives are fully informed about changes at the Terminal that could affect the community. As set forth in greater detail below, in recent years, Global has reached out to and engaged with the community in numerous ways, including hiring a community liaison. With respect to the Project, Global has prepared and is implementing a formal public participation plan (PPP) designed to inform the community about the proposed changes and obtain their input.

Global is committed to working with community members and stakeholders to ensure everyone's voice is heard and has taken numerous steps recently to fulfill that commitment, as detailed below.

- In June 2018, Global sent a letter to community members updating them on the permit modification status. The letter was mailed to all residential addresses in roughly a one-mile radius around the Terminal.
- Global employees including executives, met with community leaders and neighbors on a regular basis.
- In August 2019, Global hired a full-time community liaison for the company with more than 35 years of community involvement experience in Albany.
- In November 2019, Global conducted a tour of the Terminal for local political leaders and others to familiarize them with Terminal operations.
- Global recently leased an office located at 40 South Pearl Street, Albany, NY, to facilitate community outreach. The office will be open regular hours and by appointment.
- Global supports K-12 education and recreation programs, community organizations, and public safety programs in Albany. Global also donates home heating oil to help families in need.
- Global contributes to numerous local organizations, including the Albany Police Athletic League, the Albany Boys and Girls Club, and Lark Street Business Improvement District (including *Movies Under the Stars* sponsorship), among many others.

Going forward, Global is committed to ensuring community engagement with respect to major projects at the Terminal. The Terminal is situated in an area that is identified as a potential environmental justice (EJ) area. Based on a review of GIS mapping and demographic application layers, DEC previously determined that census blocks meeting the EJ criteria are situated in the area north and west of the Terminal.

Because of the Project's proximity to EJ areas, Global has prepared a comprehensive PPP pursuant to DEC Commissioner's Policy CP-29, *Environmental Justice and Permitting,* with the goal of ensuring that members of EJ communities in the vicinity of the Terminal and other stakeholders are informed about the Project and provided with opportunities to provide input. The specific goals of the PPP are to:

- Establish avenues for members of the South End community and other stakeholders to learn about the planned changes at the Terminal and provide input.
- Create opportunities that foster open and effective dialogue with stakeholders.
- Build relationships with community members and other stakeholders.
- Provide forums to hear and respond to concerns.
- Identify any actions that minimize impacts on the community and the environment.

Consistent with these goals, the PPP identifies key stakeholders and establishes a program for communicating information about the Project that includes:

- A letter to stakeholders several weeks in advance of an open house concerning the Project;
- A letter to stakeholders concerning the Project will be sent after the Application has been submitted to DEC;
- A public meeting concerning the Project to be held after submission of the Application;
- Updating the website for the Terminal to include information concerning the Project;
- Making key documents available on the Terminal website and in various local document repositories.

As of the date of submission of Global's Application, Global had submitted a copy of its PPP to DEC for review. In addition, Global held an open house concerning the Project in the Community Room at Ezra Prentice Homes on February 25, 2020. Three weeks prior to the open house, notice was sent to individuals residing within an approximately one mile radius of the Terminal as well as numerous other stakeholders identified in the PPP. In addition, notice of the open house was posted in various locations throughout the community. Approximately 40 individuals attended the open house. The complete details of Global's public participation program are set forth in the PPP.

These public outreach efforts concerning the Project are in addition to those mandated by the State Administrative Procedures Act and DEC's implementing regulations.

Global will consider the information obtained during these public outreach efforts in its discussions with DEC concerning the Project. It will also prepare a document responding to the comments received. Consistent with CP-29, Global also will prepare status updates concerning its public outreach efforts.

15.0 REFERENCES

Albany Port District Commission. 2016. Port of Albany: 2015 Year in Review (2016). Available at: https://flipflashpages.uniflip.com/3/95006/374025/pub/html5.html (Accessed December 2019).

Capital District Transportation Committee. 2018. S. Pearl St. Heavy Travel Pattern Study (2018). Available at: https://www.cdtcmpo.org/images/freight/S-Pearl-HV-Final-Aug-7-2018_Reduced.pdf (Accessed December 2019).

City of Albany. 1991. City of Albany Local Waterfront Revitalization Program (1991). Available at: https://docs.dos.ny.gov/opd-lwrp/LWRP/Albany_C/Index.html (Accessed December 2019).

City of Albany. 2012. ALBANY 2030: The City of Albany Comprehensive Plan (2012). Available at: http://www.albany2030.org/general/final-plan (Accessed December 2019).

Creighton Manning. 2016. Memorandum, Port of Albany Truck Traffic (October 31, 2016).

New York State Department of Environmental Conservation. 2014. Albany South End Community Air Quality Screening (Aug. 2014). Available at: www.dec.ny.gov/chemical/98328.html (Accessed December 2019).

New York State Department of Environmental Conservation. 2018. New York State Ambient Air Quality Report for 2018 (2018). Available at: https://www.dec.ny.gov/docs/air_pdf/2018airqualreport.pdf (Accessed December 2019).

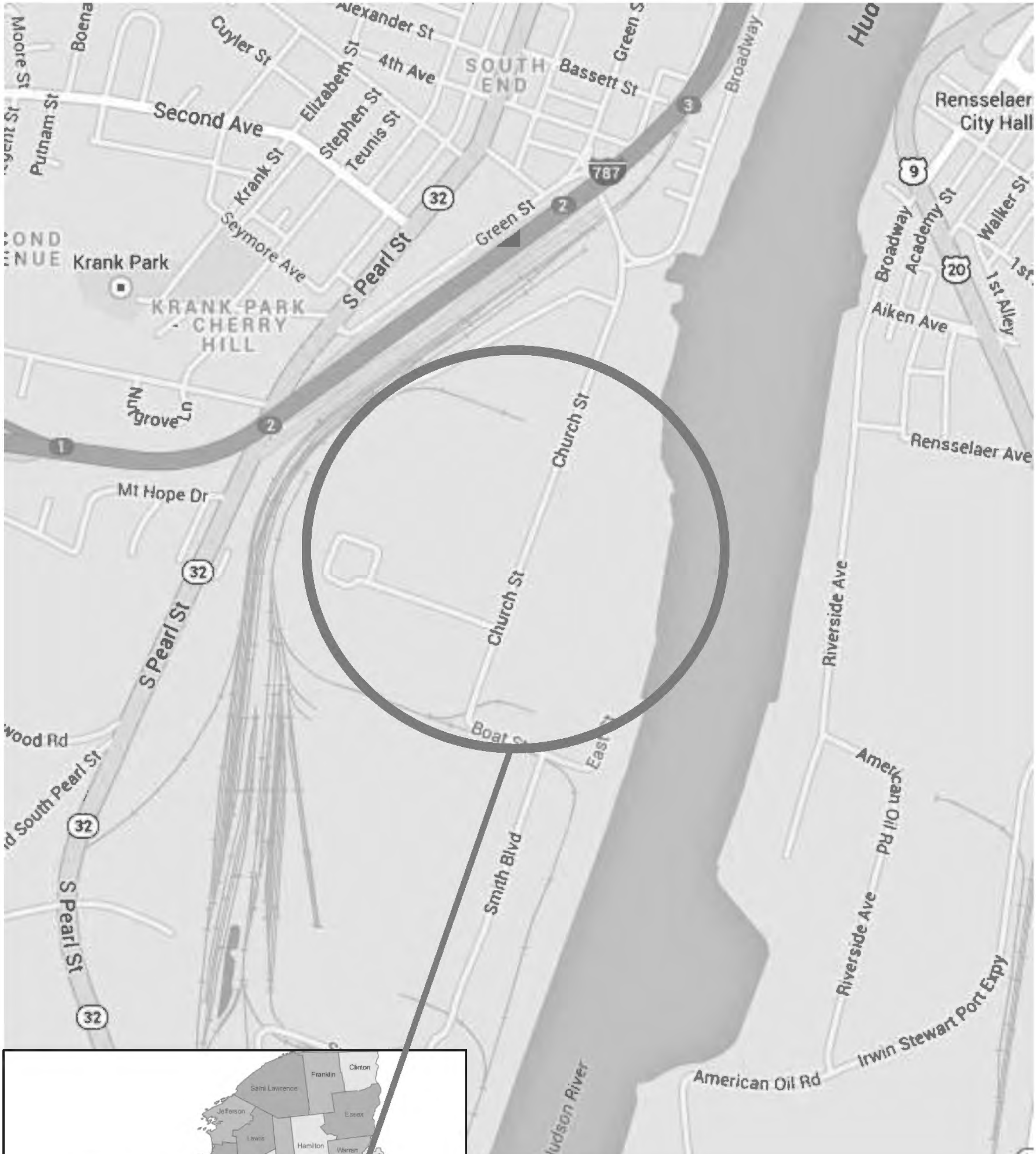
New York State Department of Environmental Conservation. 2019. Albany South End Community Air Quality Study (Oct. 2019). Available at: http://www.dec.ny.gov/docs/air_pdf/albanysouthendreport.pdf (Accessed December 2019).

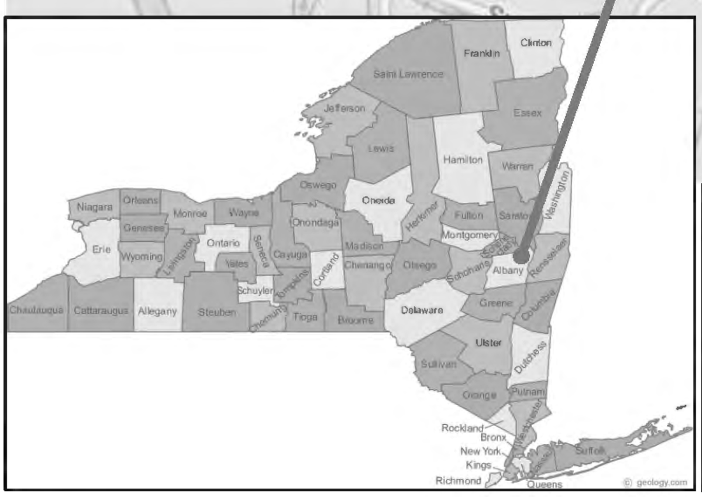
U.S. Department of Energy (USDOE), Biodiesel Handling and Use Guide, DOE/GO-102016-4875 (Nov. 2016). Available at: https://afdc.energy.gov/files/u/publication/biodiesel_handling_use_guide.pdf (Accessed February 2020).

U.S. Environmental Protection Agency (USEPA), Greenhouse Gas Emissions from a Typical Passenger Vehicle (EPA-420-F-18-008). (April 2018). Available at: http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100U8YT.pdf (Accessed December 2019).

Attachment A

Site Location Map





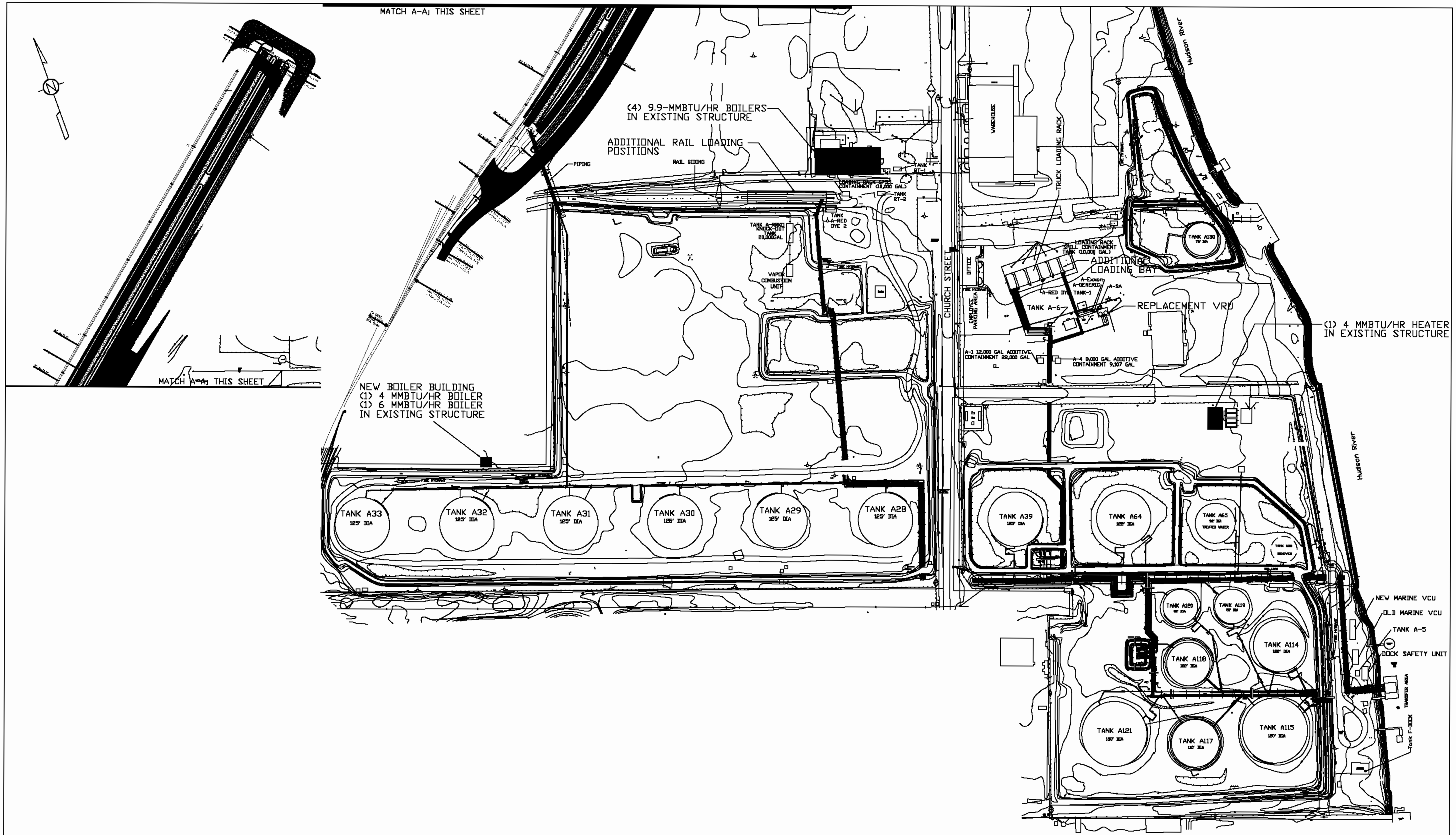
TITLE:	**ATTACHMENT A - SITE LOCATION MAP**
LOCATION:	**50 CHURCH STREET** **ALBANY, NEW YORK**

envirospec ENGINEERING, PLLC

16 Computer Drive West
Albany, NY 12205
Phone: 518.453.2203
Fax: 518.453.2204
www.envirospeceng.com

Attachment B

Site Plan



1 SP-1 ALBANY TERMINAL SITE PLAN
SCALE: AS SHOWN

envirospec ENGINEERING, PLLC
349 NORTHERN BLVD.
ALBANY, NY 12204
PHONE: 518.438.6809
FAX: 518.438.6527

REV	DATE		DRN	CKD.	APPD.
1	03/20	PROPOSED PROJECT REVISION	NB		

DIAGRAM #1
PORT OF ALBANY TERMINAL

Attachment C

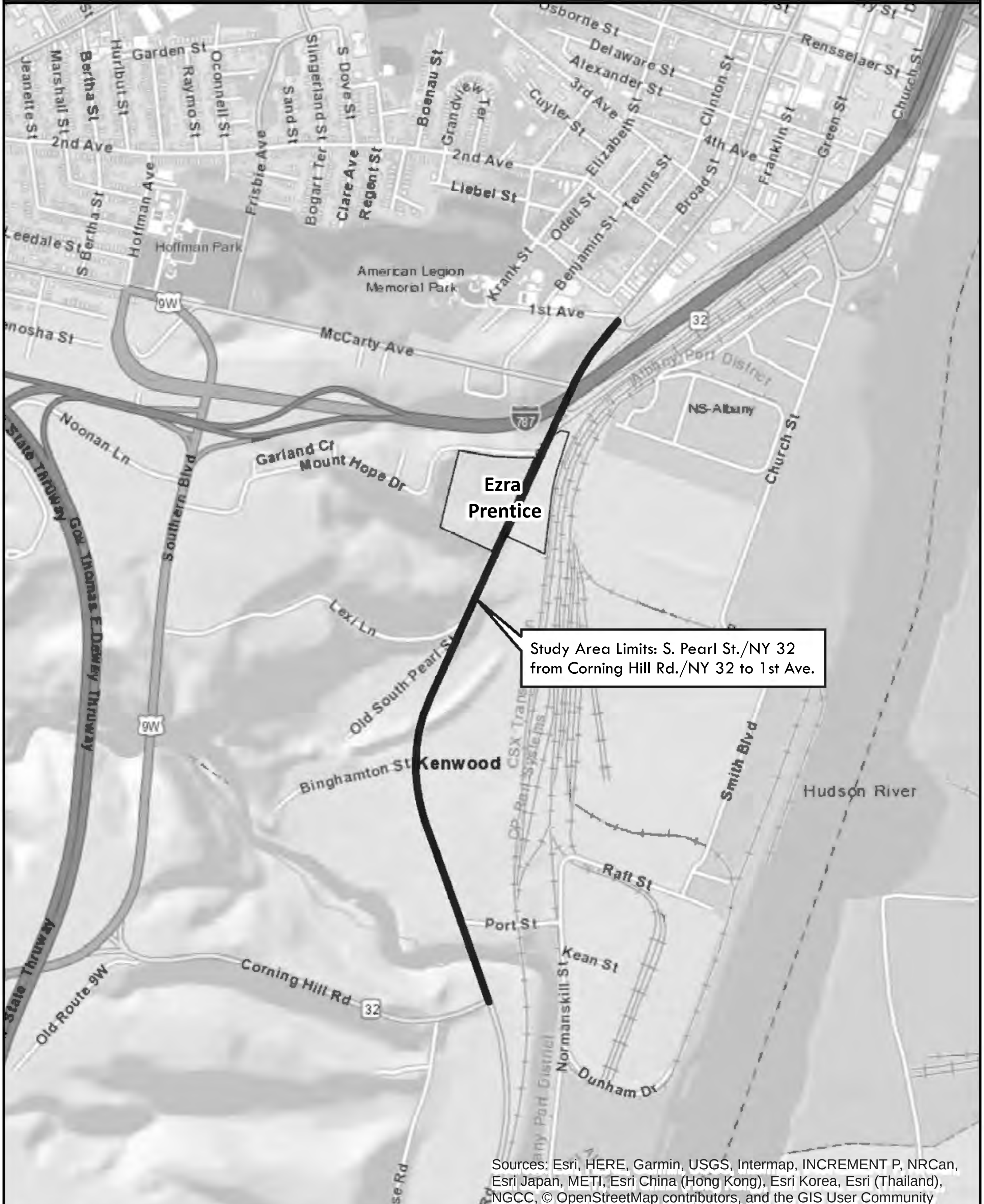
Zoning Map


Town of Colonie
Town of Guilderland
To Map Inset
CITY OF ALBANY
MAP INSET
Town of Colonie
NTS
Town of Guilderland
To Downtown
Rensselaer
County
Town of Bethlehem
Harriman
State Office Campus
Washington Park
Hudson River
Residential
R-1L Residential, Single-Family, Low Density
R-1M Residential, Singel Family, Medium Density
R-2 Residential, Two-Family
R-M Residential, Multi-Family
R-T Residential, Townhouse
R-V Residential, Village
USDO District
MU-CH Mixed-Use, Community Highway
MU-CI Mixed-Use, Campus/ Institutions
MU-CU Mixed-Use, Community Urban
MU-DT Mixed-Use, Downtown
MU-NC Mixed-Use, Neighborhood Center
MU-NE Mixed-Use, Neighborhood Edge
MU-FC Mixed-Use, Form-Based Central Ave
MU-FM Mixed-Use, Form-Based Midtown
MU-FS Mixed-Use, Form-Based South End
MU-FW Mixed-Use, Form-Based Warehouse
USDO District
LC Land Conservation
I-1 Light Industrial
I-2 General Industrial
rezone
ALBANY
A Vibrant City Initiative
renew • reinvest • reimagine
0.5
0
0.5
Miles
Feet
1,000
0
1,000
Notes:
On May 15, 2017, the Albany Common Council moved to adopt the new rezoned boundaries. Ordinance takes effect June 1, 2017.
10/16/2017 BG - Boundary correction Form-Based Code on Central Ave (MU-FC / MU-FM).
11/09/2017 BG - Boundary correction, R-2 to MU-NE on Western/N Pine.
The City of Albany Department of Planning and Development provides this figure for illustrative purposes only. Unauthorized attempts to modify or utilize this figure for other than its intended purposes are prohibited. All locations are approximate. The City makes no claims or guarantees about the accuracy or currency of the contents of the data provided and expressly disclaims liability for errors and omissions in its contents.
ASSIDUITY
City of Albany
Albany County, New York
ZONING MAP

Attachment D

Map of Capital District Transportation Committee Study Area

Figure 1: Study Area



City of Albany: S. Pearl St. Heavy Vehicle Travel Pattern Study

N

0 500 1,000 2,000 Feet

1 in = 1,500 feet

Date Produced: April 13, 2018

Attachment E

Global Truck Route Study

GLOBAL COMPANIES LLC

TRUCK ROUTE STUDY

PREPARED BY:

alta PLANNING + DESIGN

November 11, 2019

INTRODUCTION

In July 2019, Alta Planning + Design was retained to perform a license plate survey on behalf of the Global Companies LLC. Global Companies has a facility at the Port of Albany in Albany, NY, and specializes in land-based liquid fuel transport using tanker trucks (see Fig. 1). The scope of this survey was to note the identifica-tion (including license plate number and/or company name) of fuel tanker trucks leaving the Global terminal at the Port, and comparing them to the identities of fuel tanker trucks observed traveling on NYS Route 32 (South Broadway) in the City of Albany, between the trucking facility and Ezra Prentice Homes on S Pearl Street (Rt. 32). The data collected from the two observation sites was then cross-referenced to find all, if any, matches between tanker trucks leaving the Global facility and tanker trucks traveling on NYS Route 32. The detailed methodology and results are shared below.

METHODOLOGY

The license plate, company name, time of day, and direction of travel for passing tanker trucks was collected over two 12.5-hour periods between the hours of 4:00 am and 4:00 pm via camcorders, still photos and hand-written notes at the following locations:

- "North" site: Global Companies terminal, 50 Church Street, Albany, NY
- "South" site: Ezra Prentice Homes, 625 South Pearl Street (Rt. 32), Albany, NY

Full data accuracy was hindered by limited visual conditions, such as dark-ness, truck speed, illegible license plates, tanker trucks with no obvious markings, and other cars blocking the truck plates. It was noted that a detour was posted at intersection of S Pearl Street and the exit/entrance ramps to I-787, which could

Figure 1. A typical tanker truck observed during the study.

have potentially manipulated traffic, but it is unlikely given the location and route of the detour.

Upon completion of the data collection, license plate numbers, tanker numbers, times, and/or company names were compared between north and southbound tanker trucks on S Pearl Street and tanker trucks exiting the Global Facility. The data was analyzed to identify definitive and possible matches.

DATA SUMMARY

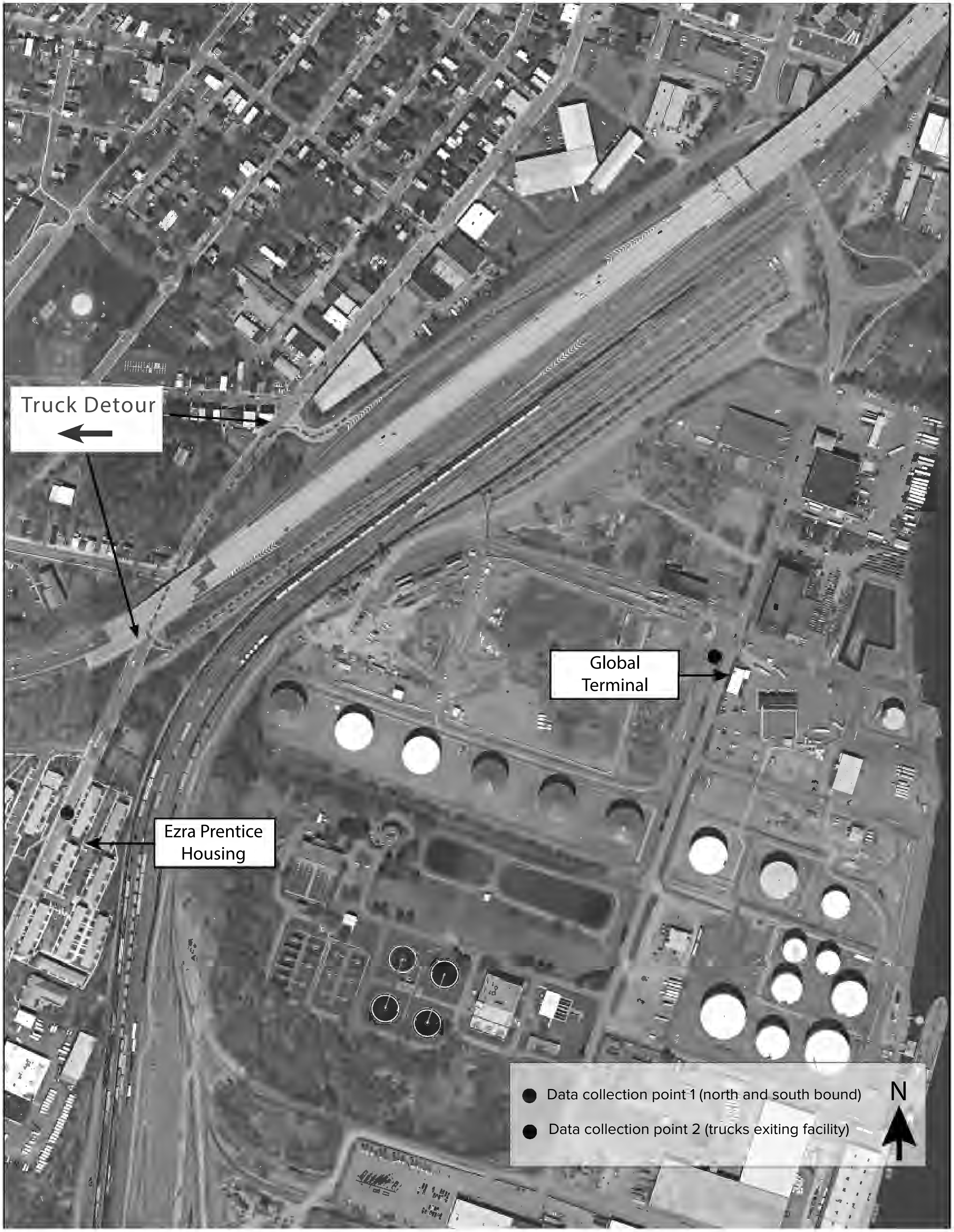
Item	Tuesday	Wednesday	Total	Average
Total Tanker Data Captured	336	369	705	352
Total Tankers on South Pearl I	198	221	419	209
Total Tankers Northbound	106	113	219	109
Total Tankers Southbound	92	108	200	100
Total Tankers Leaving Global	138	148	286	143

SUMMARY OF STUDY FINDINGS

Type of Match	Counts	% of Tanker Trucks on S. Pearl (419)
Definitive Matches: Leaving Global/Captured Southbound on South Pearl	21	5%
Possible Matches: Leaving Global to South Pearl	6	1%
Total Matches	**27**	**6%**

Of the 419 tanker trucks counted on South Pearl Street, only 5% matched and 1% possibly matched to those exiting or entering the Global facility. Of the 286 total trucks that left the global facility over the course of the two-day count, less than 10% routed to South Pearl Street.

DATA COLLECTION SITES



Attachment F

Global Odor Study

O
S&E

Odor Science & Engineering, Inc.

ODOR EVALUATION OF THE GLOBAL ALBANY TERMINAL AND SURROUNDING AREA
PORT OF ALBANY NY

Prepared for:
Global Companies LLC

Prepared by:
Odor Science & Engineering, Inc.

October 23, 2019

OS&E Project No. 2153-M-00

Odor Science & Engineering, Inc. 105 Filley Street, Bloomfield, CT 06002
Phone: (860) 243-9380 Fax: (860) 243-9431 www.odorscience.com

TABLE OF CONTENTS

Figures

1. INTRODUCTION

Odor Science & Engineering, Inc. (OS&E) was retained by Global Companies LLC to conduct ambient odor monitoring at Global's tank farm/terminal located at 50 Church Street in Albany, NY and in the surrounding area. The Global terminal site is located in an industrial area at the Port of Albany on the west bank of the Hudson River shown in Figure 1. The tank farm consists of 17 tanks containing products including ethanol, gasoline and diesel. Tank loading and unloading is conducted at on-site rail, truck and marine loading stations all of which are equipped with vapor control and treatment systems. Potential sources of odor at the Global terminal and surrounding area include a municipal waste water treatment facility, the Global facility and other tank farm and terminal operations, asphalt storage tanks, an asphalt plant and grain/feed operations. In addition, the land to the east (across the Hudson and on the east bank) is occupied by a number of industrial facilities in the Port of Rensselaer. Potential odor sources on the east bank include cogeneration power plants, a large metal salvage yard, Albany Asphalt Plant, as well several active bulk storage and petroleum distribution facilities.

The objective of the ambient odor monitoring was to provide an odor baseline for the Global facility determining the distance to which any Global terminal-related odors could be detected off-site as well as documenting the odor impact of other sources in the surrounding area. The odor monitoring was conducted over the 5-day period: September 9th – 13th, 2019.

Four (4) on-site and twelve (12) off-site odor surveys were conducted by OS&E over the 5-day period. The surveys were conducted at various times of the day and night to document the full range of diurnal meteorological patterns. During the surveys, the location, odor concentration, intensity, character and likely source of any odor detected were documented along with the meteorological conditions. The methodology used in quantifying and characterizing the odors is described in Section 2 of this report. The findings from this investigation are presented in Section 3.

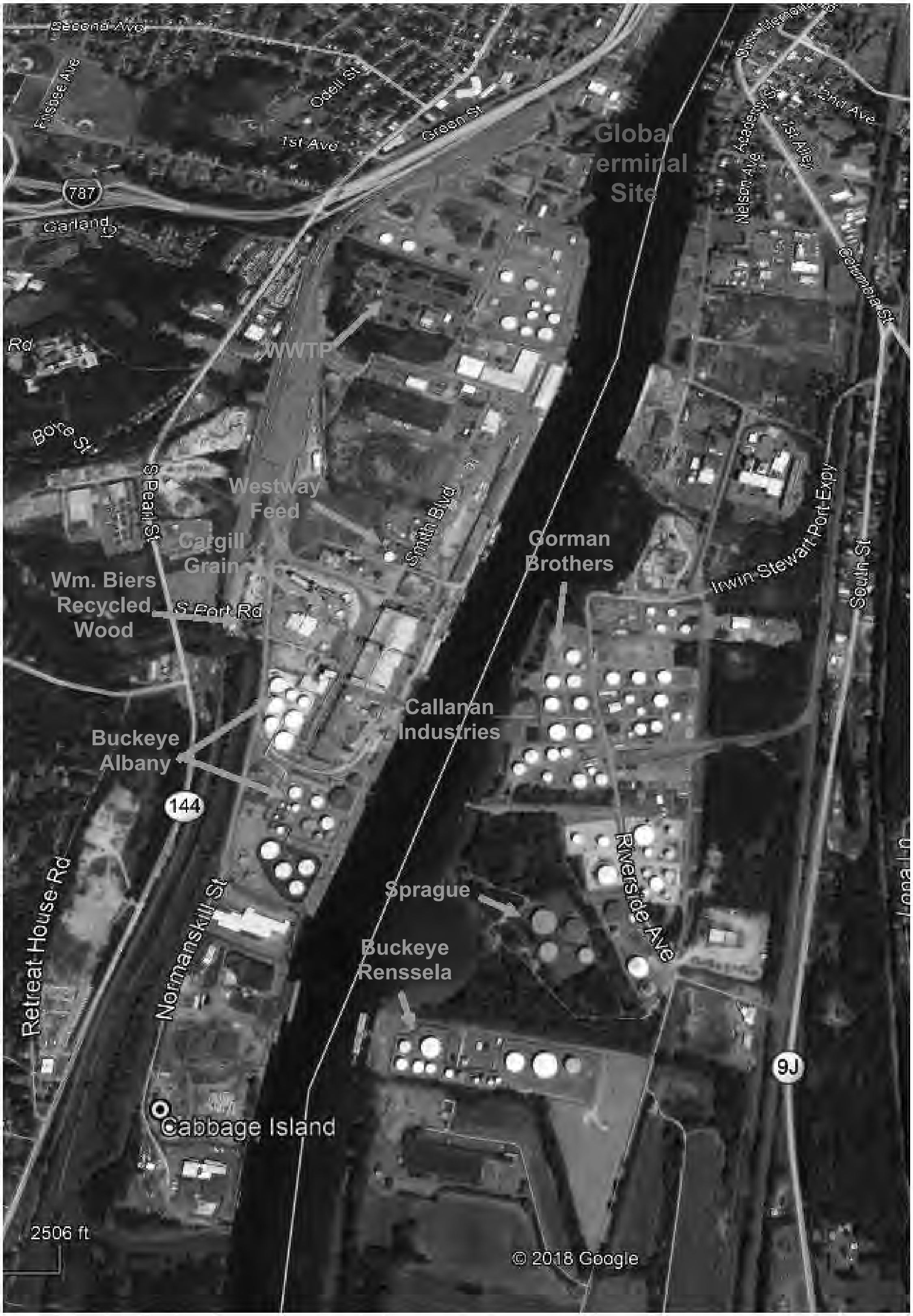


Figure 1. Global Terminal Site & Surrounding Area – Port of Albany

2. METHODOLOGY

Measurement of Odor Concentration with Portable Olfactometer

Odor concentration provides a measure of how many times an odor needs to be diluted to be reduced to the threshold level, at which only 50% of normal human population is able to detect the odor. Accordingly, odor concentration is often measured by a statistical procedure utilizing a panel of odor observers. This procedure, referred to as dynamic dilution olfactometry, follows the methodology specified in the ASTM Recommended Practice E679-04. The procedure is performed using odor samples collected in suitable containers, typically flexible bags made of inert and impervious material such as Tedlar. This procedure is not well suited for low level ambient level odors, in large part due to potential deterioration of such samples associated with sample storage and transport. For this reason, the analysis of ambient odors is typically performed in the field using portable olfactometers such as a Scentometer described below and shown in Figure 2-1.

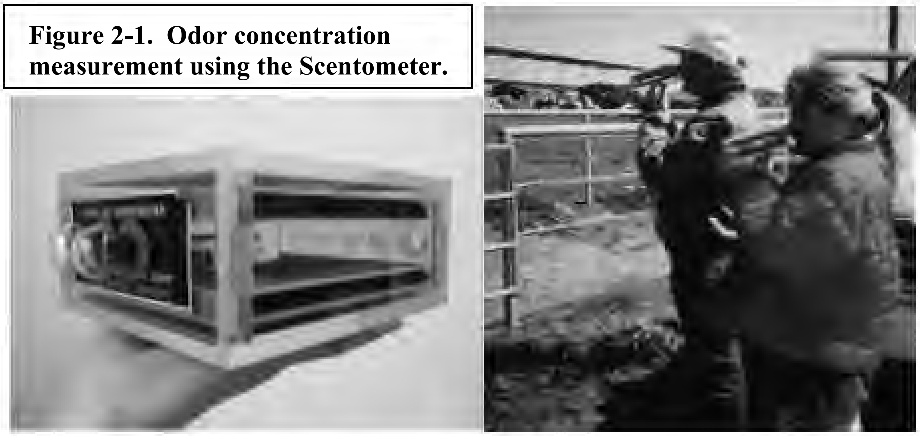
Odor concentration does not provide as direct an indication of how objectionable an odor may be as does odor intensity, as described below. The reason is that different odors with the same odor concentration may have significantly different intensities. Nevertheless, some states and other jurisdictions have developed regulations limiting ambient odors based on odor concentration as measured by a portable olfactometer. In most cases the limit (maximum allowable odor concentration) has been set at 7 to 1 dilutions to threshold (D/T). Odors with very low concentration, such as a 2 to 1 dilution or < 2 D/T, are so close to threshold level that they would be very unlikely to be considered objectionable.

Ambient odor levels were measured using a Scentometer. This instrument provides a number of pre-set dilutions to measure the concentration of ambient odors. These dilutions are generated with a stream of activated carbon filtered air. The flow of both the uncontrolled odorous ambient air and the carbon filtered air used for dilution is generated by breathing through the instrument. The rate at which ambient air is introduced into the instrument is controlled by the observer who successively opens a series of inlet orifices of increasing size. Thus, the odor concentration evaluated by the observer increases successively until it becomes sufficiently high for the observer to detect the odor. In this sense the

Odor Science & Engineering, Inc. 105 Filley Street, Bloomfield, CT 06002
Phone: (860) 243-9380 Fax: (860) 243-9431 www.odorscience.com

instrument functions like a gas mask with a pre-set series of controlled and calibrated leaks. The reported odor concentration is the lowest concentration at which the odor is detected.

Figure 2-1. Odor concentration measurement using the Scentometer.



Odor Intensity

Odor intensity is the perceived strength of the odor sensation. More than any other property of odor, perceived odor intensity is what triggers odor complaints. It is measured by comparing the intensity of the odor perceived to that noted when sniffing standardized concentrations of a reference odorant. In this country, n-butanol is used as the reference odorant as prescribed by ASTM Method E544-18, "Recommended Standard Practices for Referencing Suprathreshold Odor Intensity". The now widely used n-butanol odor intensity scale is based on n-butanol vapor as the odorant at eight concentration levels or steps. The concentration increases by a factor of 2 at each intensity step starting with approximately 15 ppm at step 1 and ending with approximately 2000 ppm at step 8.

OS&E has developed a field kit which uses aqueous solutions of n-butanol to produce the standard vapor concentrations in the head space of the eight individual containers. In comparing intensities of various odors the differences in odor character are ignored as in comparing the intensities of lights of different colors. Numerous field investigations, as well as laboratory evaluations, have established that odors generally become objectionable when their intensity reaches 3 on the n-butanol scale. This

guideline has also been verified in many OS&E field studies conducted across the country and internationally has been found to be essentially a universal standard except, in areas where the population has become sensitized to odors because of very frequent exposure to relatively high intensities of ambient odors. In these cases, such "sensitized individuals" may complain about odors of materially lower intensities than 3.0 on the n-butanol scale.

The following description is provided as an aid in interpreting the odor intensity measurements reported in this study.

odor intensity (E544-18)	description of perceived odor
0.5 – 1	odor is detectable and recognizable but would generally be noticed only if specifically targeted, such as during an odor survey
2	odor is clearly recognizable but is likely not to be considered objectionable except in sensitized communities
3 and higher	odor is sufficiently intense to cause a distraction of a person fully occupied by some activity, such as conversation. Odor would typically be considered objectionable and would be expected to cause odor complaints

Community Odor Surveying

The purpose of the community odor surveys conducted was to locate and quantify odors present in the community and to identify their character and the likely source. Specific attention was paid to the closest residential neighborhoods to the west of the Global terminal site on both sides of RT 32 S. Pearl Street. Community surveillance was accomplished by slowly driving or walking in the areas surrounding the Global facility. When an odor was perceived, the location, time, odor character and odor intensity were recorded. Observed meteorological conditions (wind speed and direction and cloud cover) were also recorded. Local meteorological data was obtained from both AccuWeather.com and ground level measurements made using a hand held Extech Thermo-Anamometer.

Odor intensity was measured using a portable standard n-butanol reference scale, as described in the preceding section.

3.0. ODOR SURVEYS

Over the 5-day period: September 9th through September 13th, 2019 OS&E conducted odor monitoring both on-site at the Global Albany Terminal and off-site in the areas surrounding the Global terminal property. The odor surveys were conducted to document the extent of any off-site impact from Global sources as well as the impact from other odor sources in the area which could potentially cause odor complaints from nearby residents particularly the Albany Housing Authority area located to the northwest of Global.

3.1 ON-SITE ODOR SURVEYS

Four (4) on-site odor surveys were conducted inside the Global Albany Terminal property during the following times and wind conditions:

Day	Date	Time	Wind	
			direction	Speed (mph)
Tues.	9/10/19	10:45-11:45	SE-SSE	1-4
Weds.	9/11/19	15:30-17:00	Calm-S-WSW	0-3
Thurs.	9/12/19	07:00-08:15	NNE-NE	2-6 During Railcar Unloading
Fri.	9/13/19	10:45-11:30	E-ESE	1-6

The results of the on-site surveys are shown in Figures 3-1 through 3-4. The surveys were conducted by walking the areas along the storage tanks and downwind of any product transfer activities that were taking place at the time. The locations of any detectable odors are shown in red on the map, labeled in the order that they were detected. The numbers correspond to the entries in the tables on each figure which provide detailed information on the individual odor observations: intensity, character and the likely source of the odors. The meteorological conditions at the time of the survey are also included in the summary tables.

Any Global terminal-related odors detected on-site were found to be very light “gasoline/petroleum” odors which ranged in intensity from 0.25 -1.0 on the 8-point n-butanol intensity scale and measured <2 D/T. These odors were localized to the immediate areas around the tanks. No odors were detected in any areas downwind of railcar unloading activities taking place during the 9/12/19 on-site survey (Figure 3-3).

When the winds had a southerly component (Figures 3-1 and 3-4) stronger odors (up to intensity 1.5) were detected on the Global Site from other sources including the Wastewater Treatment Plant (WWTP), Westerly Feed and the Buckeye Albany asphalt plant located to the south of Global.

3.2 OFF-SITE SURVEYS

A series of twelve (12) odor surveys was conducted in the areas surrounding the Global Terminal site. Whenever an odor was detected, regardless of the potential source, its location was recorded on the map of the area along with its intensity, concentration, character and the likely source. The surveys were conducted at various times of day and night under a range of meteorological conditions. The results of the off-site surveys are presented in Figures 3-5 through 3-16.

Each survey included investigation in the closest residential neighborhoods to the northwest of the Global terminal site on both sides of RT 32 S. Pearl Street. The shaded area on each figure represents the boundary of the areas investigated during the survey. The locations of the individual zones of odors detected are shown in red, numbered in the order in which the observations were made. Any Global-related odor observations are highlighted in yellow. The numbers correspond to the entries in the table on each figure which provide the details of each odor observance. The tabular inserts in Figures 3-5 through 3-16 show the intensity of the odors on the n-butanol scale, odor concentration (in terms of “dilutions to threshold”, D/T), the character and the likely source of the odor.

In summary, Global-related odors were detected in only 3 of the 12 off-site surveys (Figures 3-9, 3-10 and 3-16). The morning survey conducted on 9/11/19 is shown in Figure 3-9. During this survey, light winds were from the S-SSW. “Gasoline/petroleum” mixed with “asphalt” odors were observed immediately adjacent to the Global site (locations 2) and a little further north on Broadway (locations 11). These odors had a maximum intensity of 1.5 and measured between <2-2 D/T.

The survey conducted later that same afternoon is shown in Figure 3-10. During this survey light winds remained from the south. Light “gasoline/petroleum” odors were detected areas immediately adjacent to the Global site shown at location 5 and along Church Street at locations 6 and 7. These odors had a maximum intensity of 1.5 and measured between <2-2 D/T.

Odor Science & Engineering, Inc. 105 Filley Street, Bloomfield, CT 06002
Phone: (860) 243-9380 Fax: (860) 243-9431 www.odorscience.com

The survey conducted during the afternoon hours on 9/13/19 is shown in Figure 3-16. During this survey winds were variable between S, SE and ESE. Any detectable odors attributable to Global were again in the immediate vicinity as shown by locations 1, 2 and 3. These odors ranged in intensity from 0.5-1.5 and measured <2-2 D/T. In these cases the "gasoline/petroleum" odor was mixed with odors from other sources as well including the WWTP and from barge unloading activities taking place on the east side of the river associated with Gorman Brothers terminal. Odors from the WWTP and Gorman Brothers were found to extend further northwest of Global into the residential areas during this survey shown by locations 11 through 16.

Railcar unloading activities were taking place at the Global terminal during the surveys shown in Figures 3-7, 3-11, 3-13 and 3-14. No odors were detectable in any areas downwind of the railcar unloading during any of these surveys.

The results of the baseline odor survey have shown that any odors associated with the Global Albany terminal are well below typical objectionable levels. Any odors detected beyond the Global terminal site attributable to activities at the Global terminal were both infrequent and at very low intensity levels ranging from 0.5-1.5 in the butanol scale. Odors at these intensity levels would be characterized as:

n-butanol intensity level (0-8) ASTM E544-18	description of perceived odor
0.5 – 1	**Very Faint:** An odor that would ordinarily not be noticed by the average person, but could be detected by the experienced inspector or a hypersensitive individual.
1-< 2	**Faint:** An odor so weak that the average person might detect if his attentions are called to it, but that would not otherwise attract his attention.

Odors of such intensity level would not typically be the cause of odor complaints. Our experience has shown that odor complaints are usually initiated at an odor intensity value of 3.0 or greater on the 8-point n-butanol intensity scale. This has been verified in many of our field studies across the country for a wide variety of industries and their neighboring communities. Only when a community has become "sensitized" (developed a disproportionate lack of tolerance for certain odors) is the objectionability level significantly below 3.0.

The background odors in the general Port of Albany area consist of more frequently detectable and higher intensity odors from other local industrial sources some of which are described below.

Odor Science & Engineering, Inc. 105 Filley Street, Bloomfield, CT 06002
Phone: (860) 243-9380 Fax: (860) 243-9431 www.odorscience.com

3.3 OTHER ODOR SOURCES

While specifically looking for Global-related odors, several other odor sources were identified in the Port of Albany Area. Although most odors were detected in relatively close proximity to their sources, the more significant sources in terms of observed odor intensity and odor concentration included:

Source		**Maximum Odors Observed During Off-Site Surveys**			
Code[(a)]	**Name**	**Character**	**Odor Intensity[(b)]**	**Odor Conc. (D/T) [(b)]**	**Figure No.**
F	Buckeye Albany	asphalt/petroleum	2.0-3.0	15-31	3-7
		asphalt/sulfur	1.0-3.0	2-31	3-8
		gas/asphalt/solvent	2.0-4.0	31-170	3-9
		oily/petroleum/asphalt/gasoline	1.5-3.0	31-170	3-10
		petroleum/asphalt	1.0-2.0	2-7	3-11
		asphalt/petroleum/sharp	1.0-4.0	2-170	3-16
B	WWTP	Sewage	1.0-2.5	2-15	3-6
		Sewage	1.0-2.0	2-7	3-7
		Sewage	1.0-2.0	2-7	3-8
		Sewage	1.0-2.5	2-31	3-11
		sour/sewage	1.0-2.5	7-15	3-13
		Sewage	0.5-2.0	2-7	3-16
D	Cargill Grain	sour grain/meal	1.0-2.0	7-15	3-7
		sour/rotten/grain/feed	1.0-2.5	7-15	3-8
		rotten meat/grain	1.5-2.75	7-15	3-12
C	Westway Feed	sour molasses	1.5-2.0	2-7	3-12
		sweet/sour/molasses	1.0-2.0	7-15	3-13
		sweet/sour/molasses	2.0-3.0	15-31	3-14
E	Wood Recycling	fresh wood chips	1.0-2.0	7-15	3-8
		fresh wood chips	1.5-2.0	2-7	3-9
		wood chips/mulch	1.5-2.5	2-15	3-11
		sour wood chips/mulch	1.5-2.75	7-15	3-12
		sour wood chips/mulch	0.5-2.5	7-15	3-13
		wood chips/mulch	1.0-3.0	2-31	3-14
		wood chips/mulch	1.5-3.0	2-31	3-16

a) letter indicated for source location on off-site odor survey maps
b) odor intensity on the n-butanol intensity scale 0-8 (ASTM E544-18)
c) D/T = dilutions to threshold as measured by Scentometer

Odor Science & Engineering, Inc. 105 Filley Street, Bloomfield, CT 06002
Phone: (860) 243-9380 Fax: (860) 243-9431 www.odorscience.com

ON-SITE ODOR SURVEYS

Odor Science & Engineering, Inc. 105 Filley Street, Bloomfield, CT 06002
Phone: (860) 243-9380 Fax: (860) 243-9431 www.odorscience.com

loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.5	<2	light gasoline	Global	6	0.5	<2	sweet/solvent/gas	Westway/Global
2	0.5	<2	light gasoline	Global	7	0.5-1.5	<2-2	mercaptan/sewage	WWTP
3	0.5	<2	light gasoline/petroleum	Global	8	0.5	<2	stagnant water/aeration	WWTP
4	0.5	<2	gasoline	Global	9	0.5-1.5	<2-2	rotten sludge water	WWTP
5	0.5-1.0	<2	gasoline	Global	10	0.5-0.75	<2	oily/diesel	Global
Wind: SE-SSE, 1-4 mph, gusts 5 mph, 73^{0}F, 75% cloud cover, mostly cloudy									

Figure 3-1. Tank Farm odor survey No. 1 (09/10/2019 10:30-11:45)

loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.5	<2	light sulfur	Global	3	0.25	<2	gasoline	Global
2	0.5	<2	sweet	Westway Feed	4	0.5	<2-2	paint solvent	?
Wind: S-WSW, 0-3 mph, gusts 5 mph, 89^{0}F, 40% cloud cover, mostly sunny									

Figure 3-2. Tank Farm odor survey No. 2 (09/11/2019 15:30-17:00)

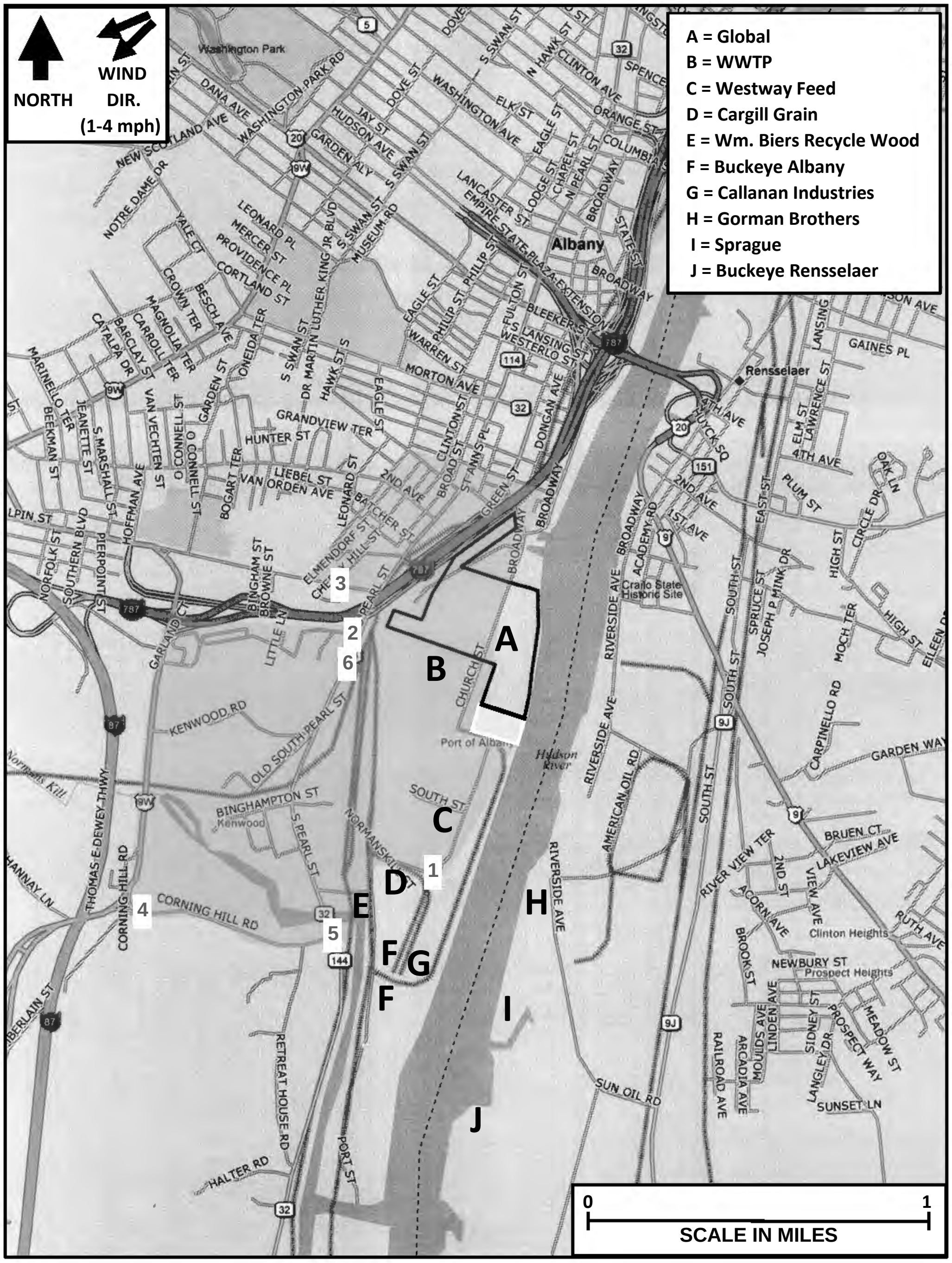
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.25	<2	gasoline	Global	4	0.5	<2	gasoline/petroleum	Global
2	0.5-1.0	<2	gasoline/solvent	Global	5	0.5-1.0	<2-2	bread baking	bakery
3	0.5	<2	gasoline/petroleum	Global	6	0.5	<2	petroleum/solvent	Global
Wind: NNE-NE, 2-6 mph, gusts 14 mph, 64^{0}F, 100% cloud cover, cloudy									

Figure 3-3. Tank Farm odor survey No. 3 (09/12/2019 07:00-08:15)

loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.25-0.5	<2	oily/petroleum	Offsite?	6	0.25	<2	gasoline	Global
2	0.25-0.5	<2	oily/petroleum	Offsite?	7	0.25	<2-2	oily/petroleum	Global
3	0.5-1.0	<2	gasoline	Global	8	0.25-1.5	<2-2	sewage	WWTP
4	0.5-1.0	<2	gas/asphalt/solvent	Global/ Asphalt Plant	9	0.5	<2-2	sour/musty/sewage	WWTP
5	0.25-0.5	<2	gasoline/petroleum	Global	10	1.0	<2	petroleum/asphalt	Asphalt Plant
Wind: E-ESE, 1-6 mph, gusts 12 mph, 70^{0}F, 35% cloud cover, partly cloudy									

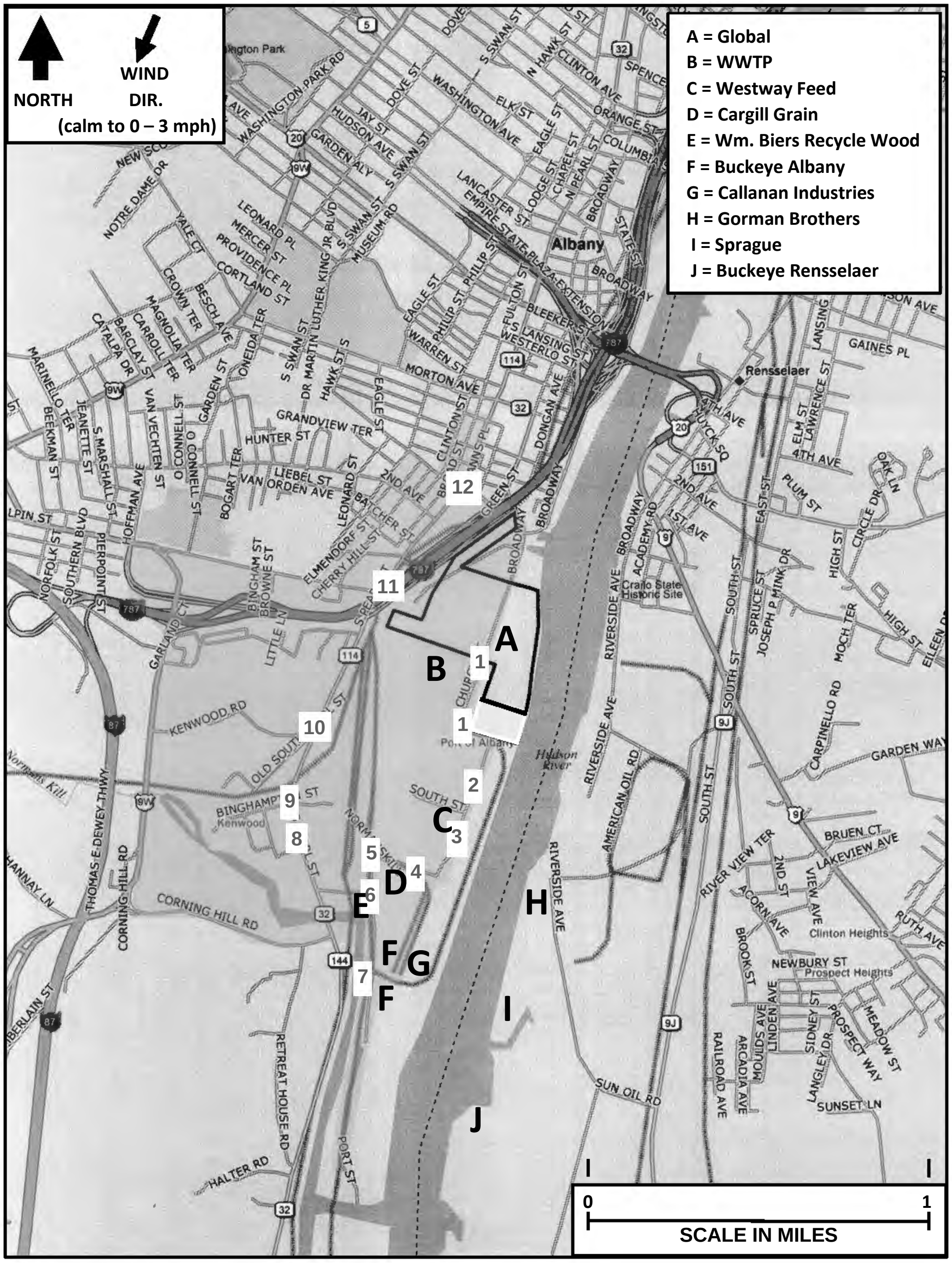
Figure 3-4. Tank Farm odor survey No. 4 (09/13/2019 10:45-11:30)

OFF-SITE ODOR SURVEYS



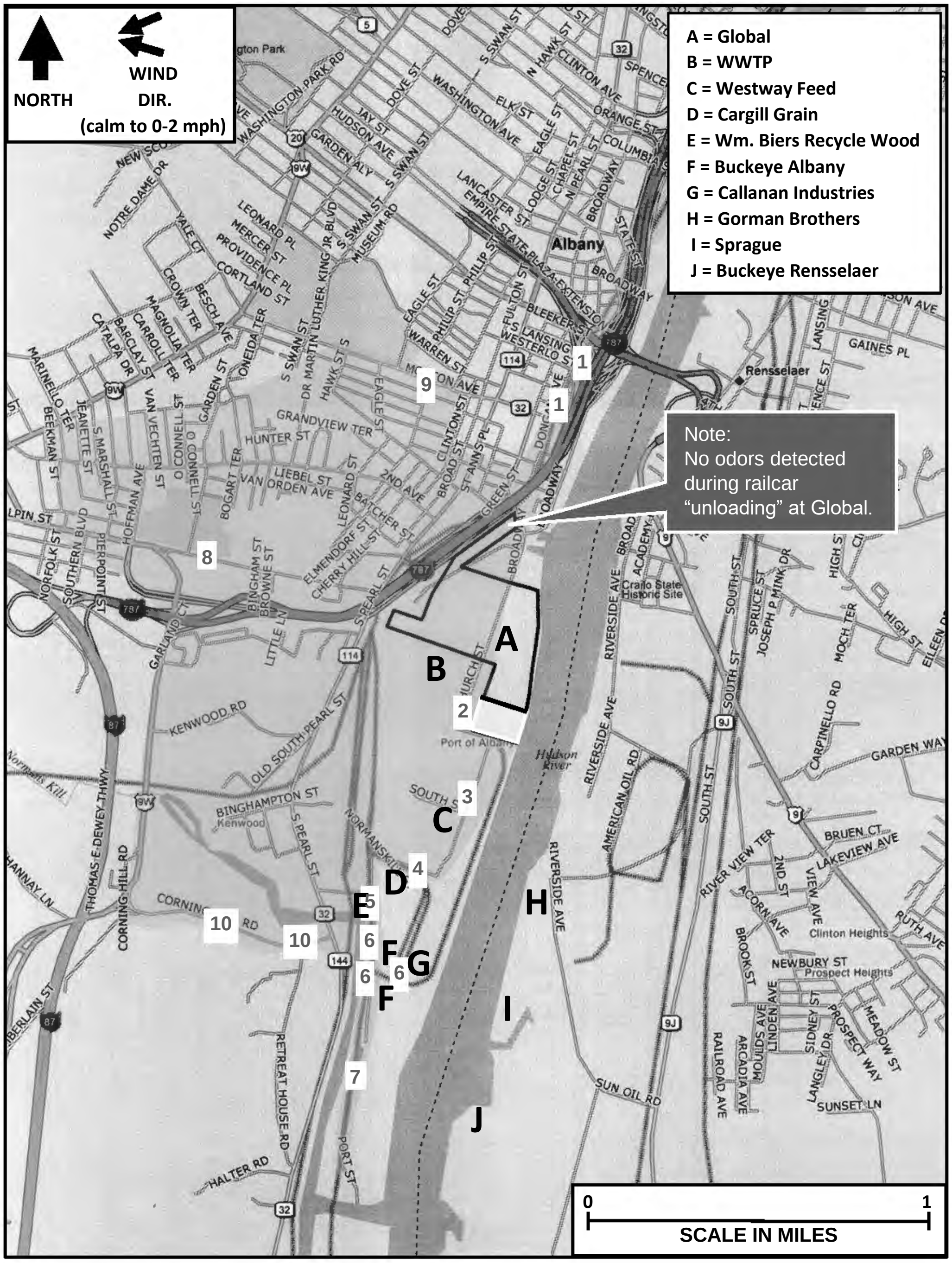
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.5	<2	oily/petroleum	H	4	0.5	<2	sewage	WWTP
2	0.5-1.0	<2	oily/petroleum /chemical	railcars on tracks C P Kenwood?	5	0.5-1.0	<2	petroleum/asphalt /pesticide	F/H?
3	0.5	<2	asphalt	newly paved road	6	0.5	<2	food cooking	local homes
Wind: ENE-NE, 1-4 mph, 71^{0}F, 65% cloud cover, mostly cloudy									

Figure 3-5. Community odor survey No. 1 (09/09/2019 13:15-15:15)



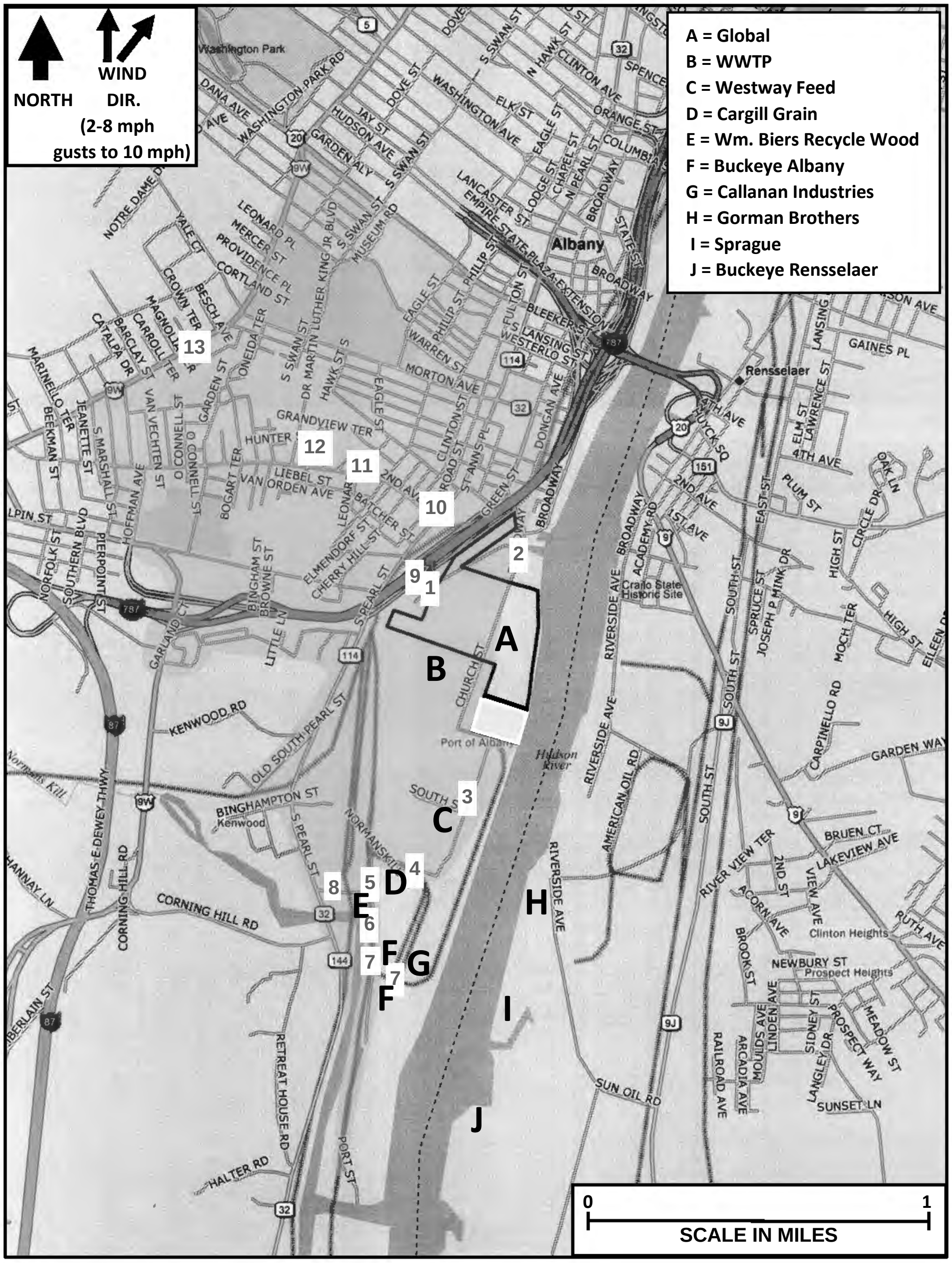
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-2.5	2-15	sewage	B	7	0.5-1.0	<2	burnt metal	scrap yard
2	1.0-1.5	<2-2	oily, petroleum, skunky	asphalt trucks	8	1.0-1.5	<2-2	sour garbage	County Waste Recycle
3	0.5-1.0	<2	sour grain	C	9	0.5	<2	sour grain	C
4	1.0-2.0	2-15	petroleum/asphalt	F	10	0.5	<2	sewage	B
5	0.5-1.0	<2	sour grain	D	11	0.5	<2	sewage	B
6	0.5-1.0	<2	sour grain	D	12	0.5-1.0	<2	garbage	local homes
Wind: ENE-NE, calm to 0-3 mph, 69^{0}F, 85% cloud cover, mostly cloudy									

Figure 3-6. Community odor survey No. 2 (09/09/2019 19:30-21:20)



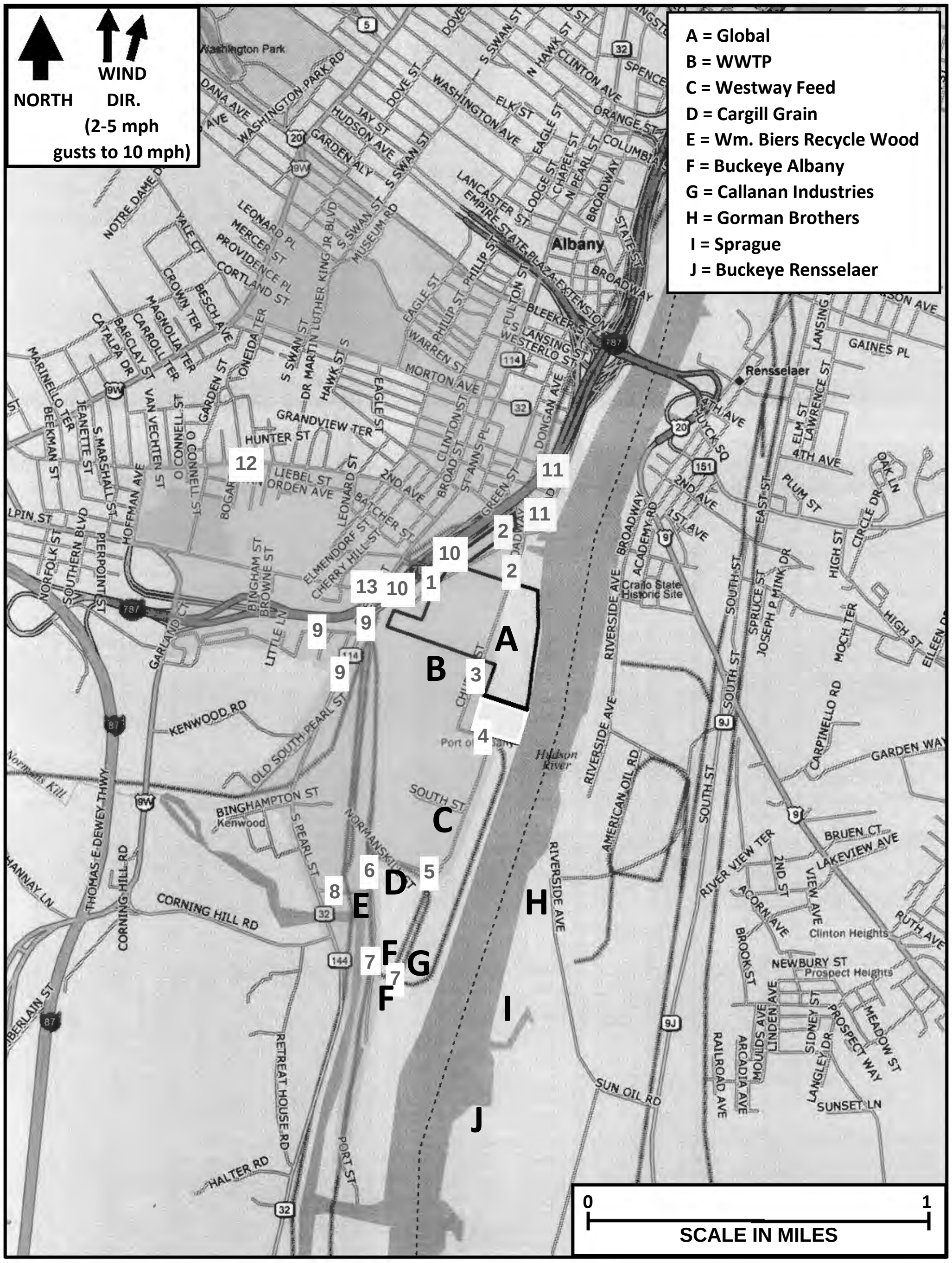
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-1.5	<2-2	baked bread	local bakery	6	1.0-2.0	7-15	sour grain/meal	D
2	1.0-2.0	<2-7	sewage	B	7	1.0-1.5	<2-2	petroleum	F
3	0.5	<2	sewage	B	8	0.5	<2	sewage	sewer drains
4	0.5-1	<2	animal feed/grain	C/D	9	1.0-1.5		sewage	sewer drains
5	2.0-3.0	15-31	asphalt/petroleum	F	10	1.0-2.0		oily/petroleum	J?
Wind: ENE-ESE, 0-2 mph, 66^{0}F, 50% cloud cover, partly sunny									

Figure 3-7. Community odor survey No. 3 (09/10/2019 07:30-09:40)



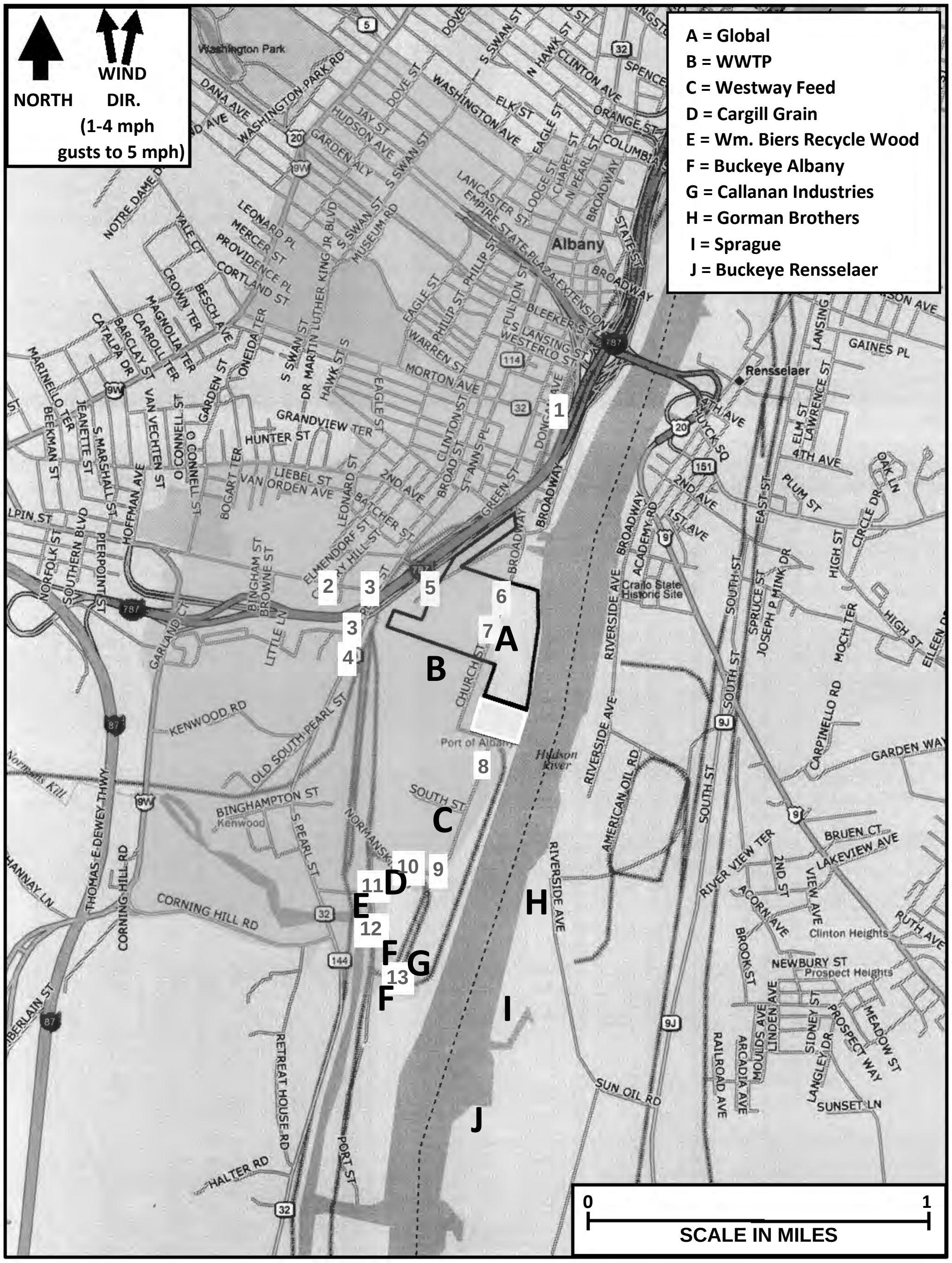
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-2.0	2-7	sewage	B	8	1.0-2.0	7-15	fresh wood chips	E
2	1.0-1.5	<2	food cooking	local rest.	9	0.5-1.0	<2	sewage	B
3	0.5-1.5	<2-2	gasoline	F?	10	0.5	<2	sewage	B
4	1.0-2.5	7-15	sour, rotten grain/feed	D	11	0.5	<2	sewage	sewer drain
5	1.0-2.0	2-7	sour, rotten, petroleum	F	12	1.0-1.5	<2	food cooking	loc. restaurant.
6	1.0-1.5	<2-2	asphalt/sulfur	F	13	1.0-2.0	2-7	fried food	loc. restaurant.
7	1.0-3.0	2-31	asphalt/sulfur	F					
Wind: S-SW, 2-8 mph, gusts 10 mph, 75^{0}F, 65% cloud cover, mostly cloudy									

Figure 3-8. Community odor survey No. 4 (09/10/2019 15:30-18:00)



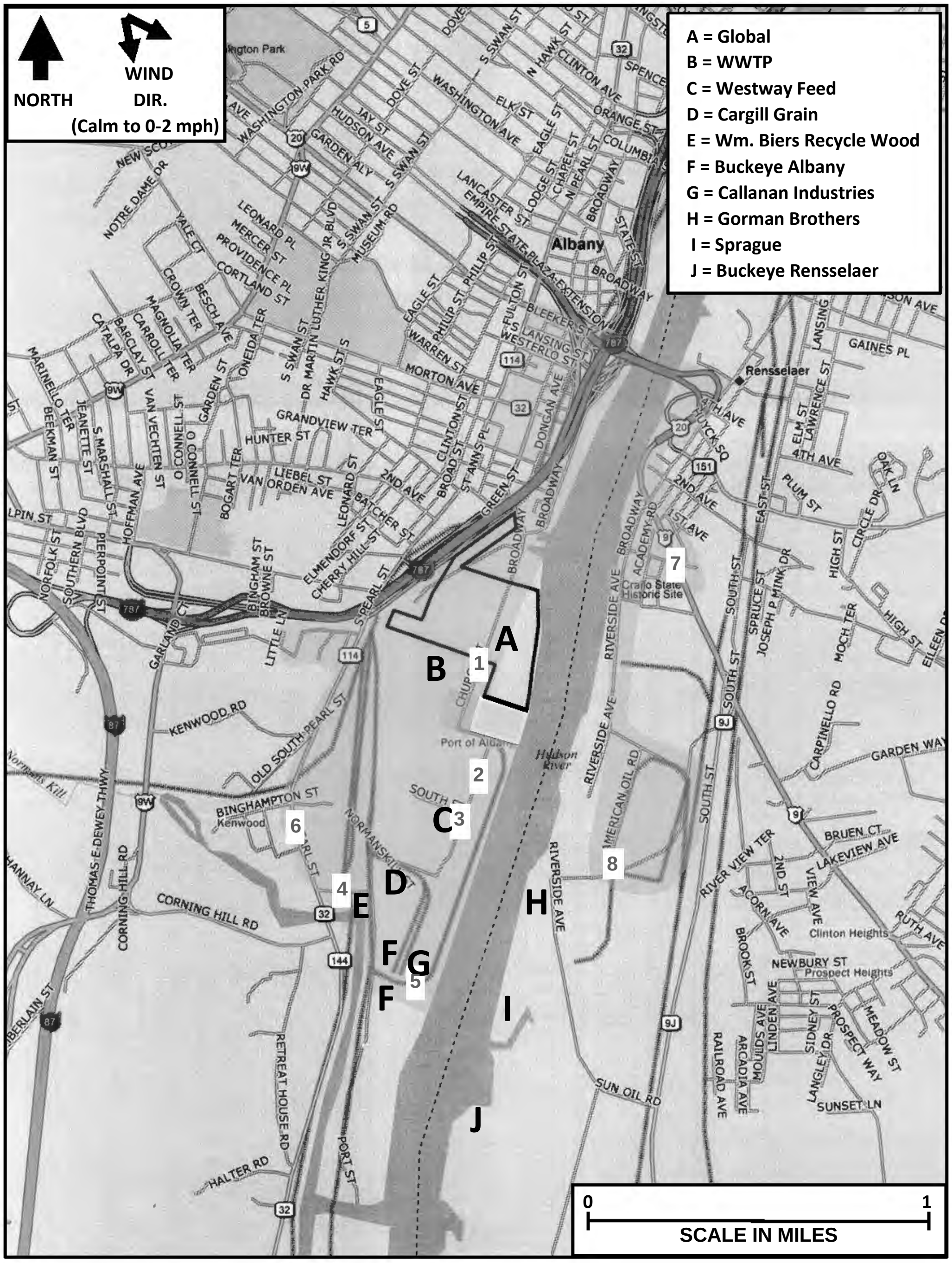
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-1.5	<2	sewage	B	8	1.5-2	2-7	fresh wood chips	E
2	1.0-1.5	<2-2	gas/petroleum/asphalt	A/F	9	0.5-1	<2	sour/grain/meal	D
3	0.5	<2	sewage	B	10	0.5-1.5	<2-2	sewage	B
4	0.5-1.5	<2-2	petroleum/asphalt	F	11	1.0	<2	petroleum/asphalt	A/F
5	1.0-1.5	<2-2	sour grain/meal	D	12	1.0	<2	sewage	sewer drain
6	1.0-1.75	2-7	gasoline/solvent	F	13	0.5	<2	sour grain/meal	D
7	2.0-4.0	31-170	gas/asphalt/solvent	F					
Wind: S-SSW, 2-5 mph, gusts 10 mph, 72^{0}F, 80% cloud cover, mostly cloudy									

Figure 3-9. Community odor survey No. 5 (09/11/2019 06:45-09:15)



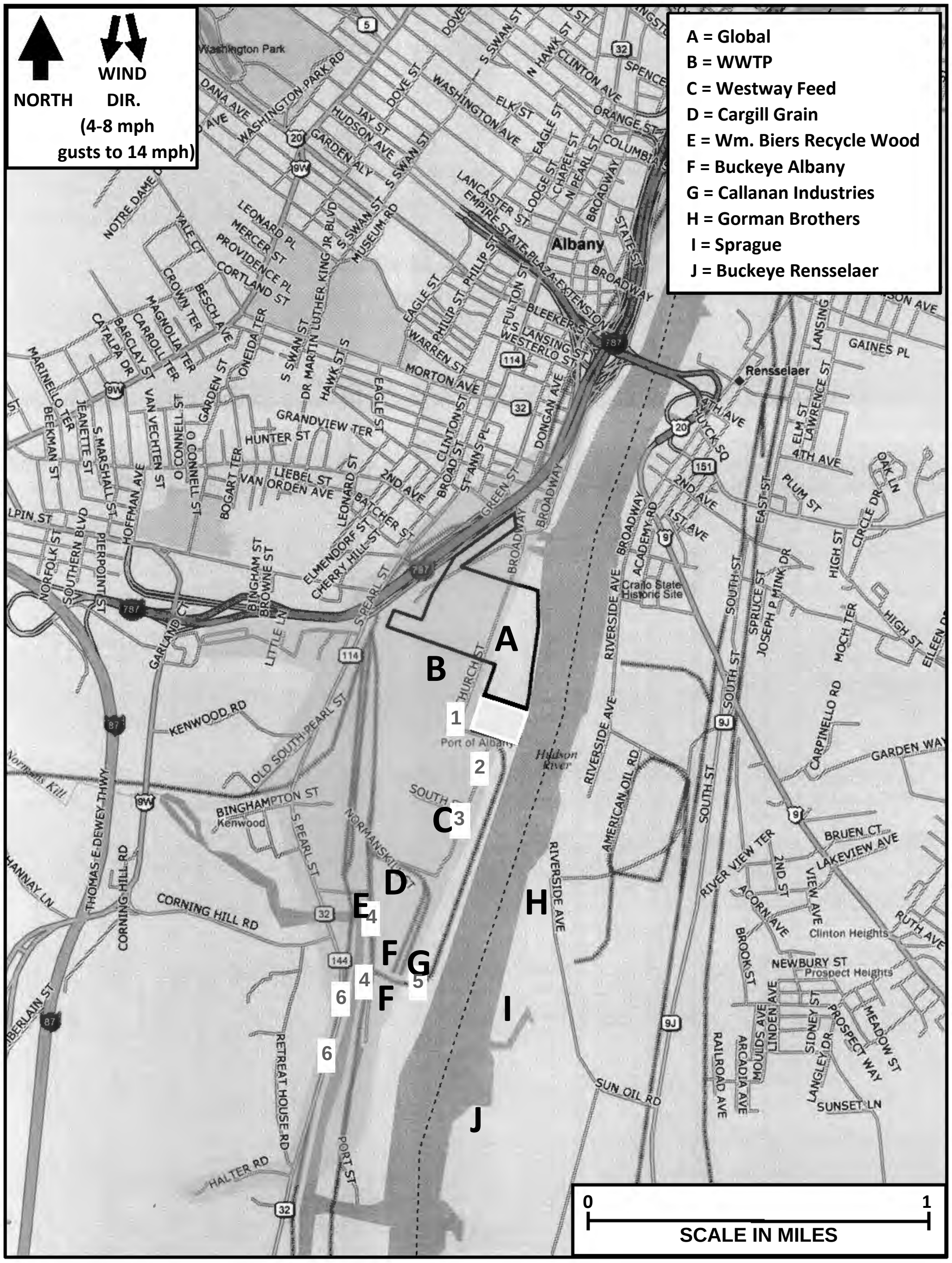
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-2.0	2-7	sewage	pump station	8	0.5	<2	oily/petroleum	F/H
2	1.0-1.5	<2-2	asphalt	repaved driveway	9	0.5	<2	sour grain/feed	D
3	1.0-1.5	<2-2	sewage	B	10	1.0	<2	petroleum/asphalt	F
4	1.0-1.5	<2-2	asphalt	repaved B-Ball court	11	0.5-1.0	<2	fresh wood chips	E
5	0.5	<2	petroleum	A	12	0.5-1.0	<2	oily/petroleum	F
6	1.0-1.5	<2-2	gasoline	A	13	1.5-3.0	31-170	oily/petroleum/asphalt/ gasoline	F
7	0.5	<2	puffs of gasoline	A					
Wind: SSE-SSW, 1-4 mph, gusts 5 mph, 87^{0}F, 50% cloud cover, partly sunny									

Figure 3-10. Community odor survey No. 6 (09/11/2019 12:30-14:50)



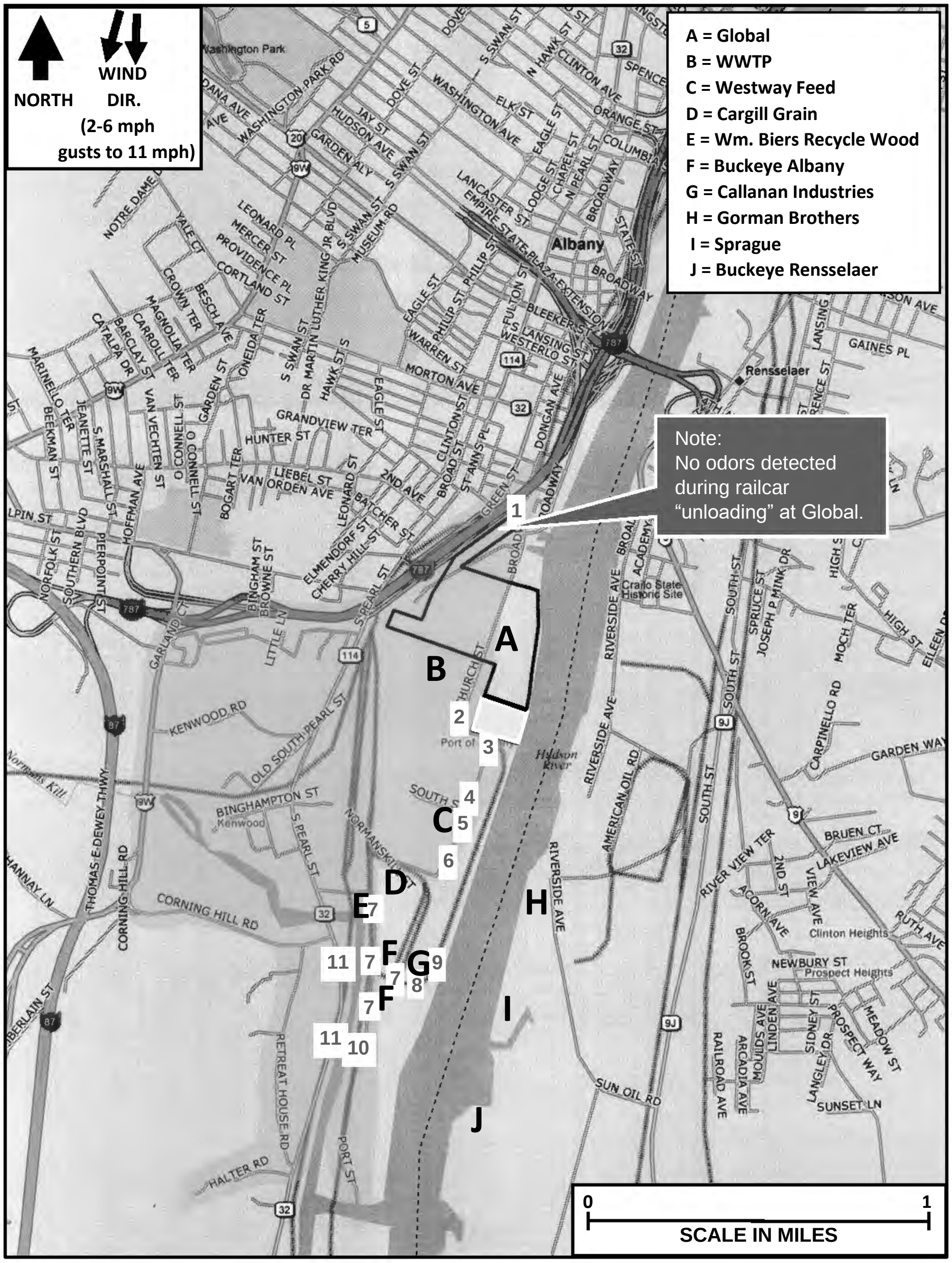
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-2.5	2-31	sewage	B	5	1.0-2.0	2-7	petroleum/asphalt	F
2	0.5	<2	light metallic	scrap yard	6	1.5-2.0	2-7	garbage	County Waste Recycle
3	0.5-1.0	<2	sour grain/meal	C	7	1.0	<2	petroleum	gas station
4	1.5-2.5	2-15	wood chips/mulch	E	8	0.5	<2	sour petroleum	New Castle asphalt plant
Wind: NNW-WNW, 0-2 mph, 78^{0}F, 20% cloud cover, mostly clear									

Figure 3-11. Community odor survey No. 7 (09/11/2019 20:30-22:00)



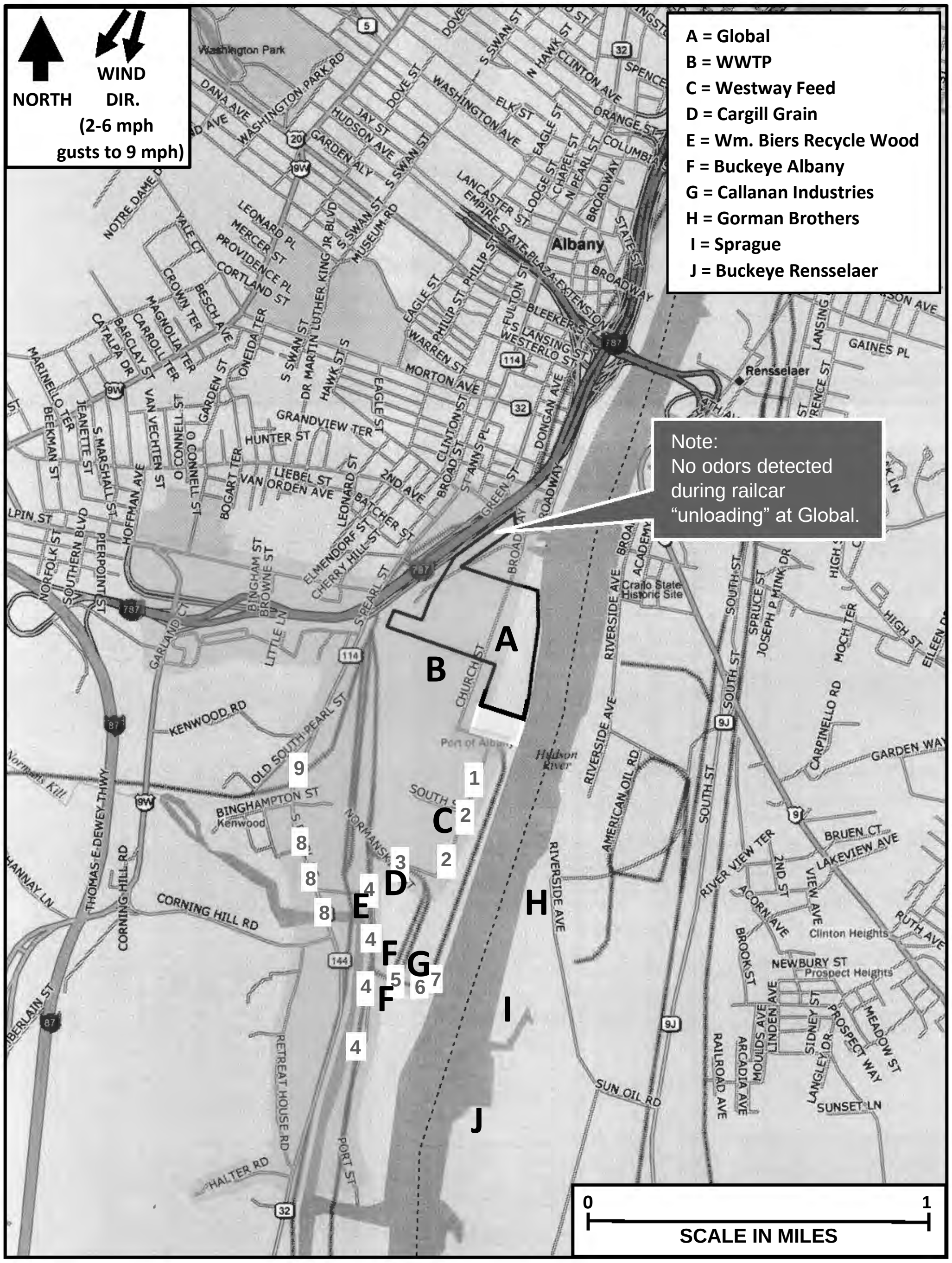
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-1.75	<2-2	sewage/burnt sludge	B	4	1.5-2.75	7-15	sour woodchips/mulch	E
2	1.0-2.0	2-7	sour food/grain/meal	C	5	1.5-2.75	7-15	rotten meat/grain	D
3	1.5-2.0	2-7	sour molasses	C	6	0.5-1.0	<2	rotten meat/sour mulch	D/E
Wind: NNW-WNW, 4-8 mph, gust to 14 mph, 61^{0}F, 100% cloud cover, cloudy									

Figure 3-12. Community odor survey No. 8 (09/12/2019 09:05-10:35)



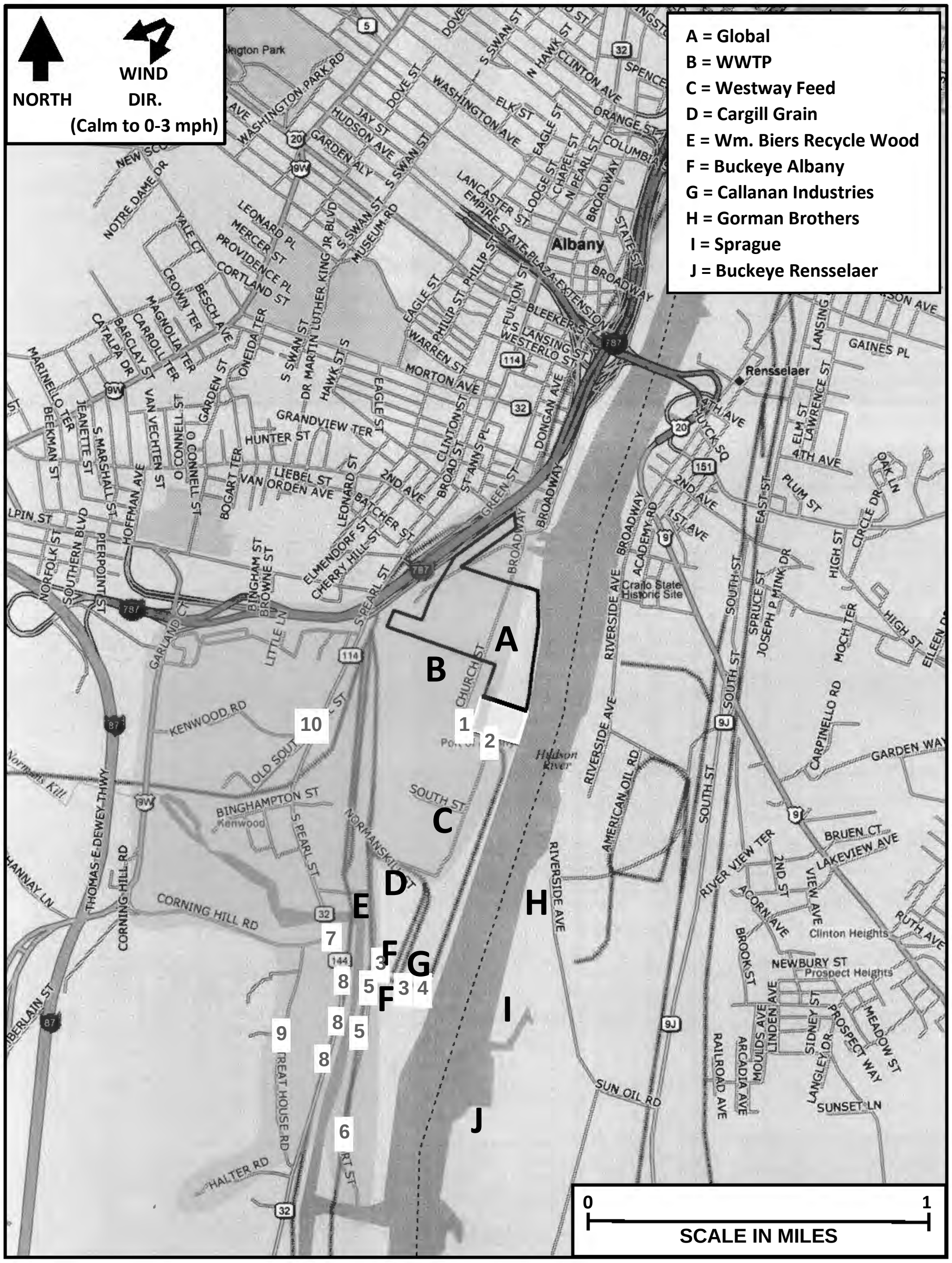
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-2.0	2-7	food cooking	local restaurant	7	0.5-2.5	7-15	sour mulch, wood chips	E
2	1.0-1.75	2	sour, rotten sewage	B	8	0.5-1.0	<2	sour grain	D
3	0.5	<2	sour, wet cardboard	Waste Management	9	0.5-1.0	<2	asphalt//sour grain	F/D
4	1.0-2.5	7-15	sour sewage	B	10	0.5-1.5	<2	asphalt//sour grain, wood chips	F/D/E
5	1.0-2.0	7-15	sweet/sour molasses	C	11	0.5-1.0	<2	wood chips	E
6	1.0-1.5	<2	new cardboard	C					
Wind: N-NNE, 2-6 mph, gusts 11 mph, 65^{0}F, 100% cloud cover, cloudy									

Figure 3-13. Community odor survey No. 9 (09/12/2019 14:10-16:00)



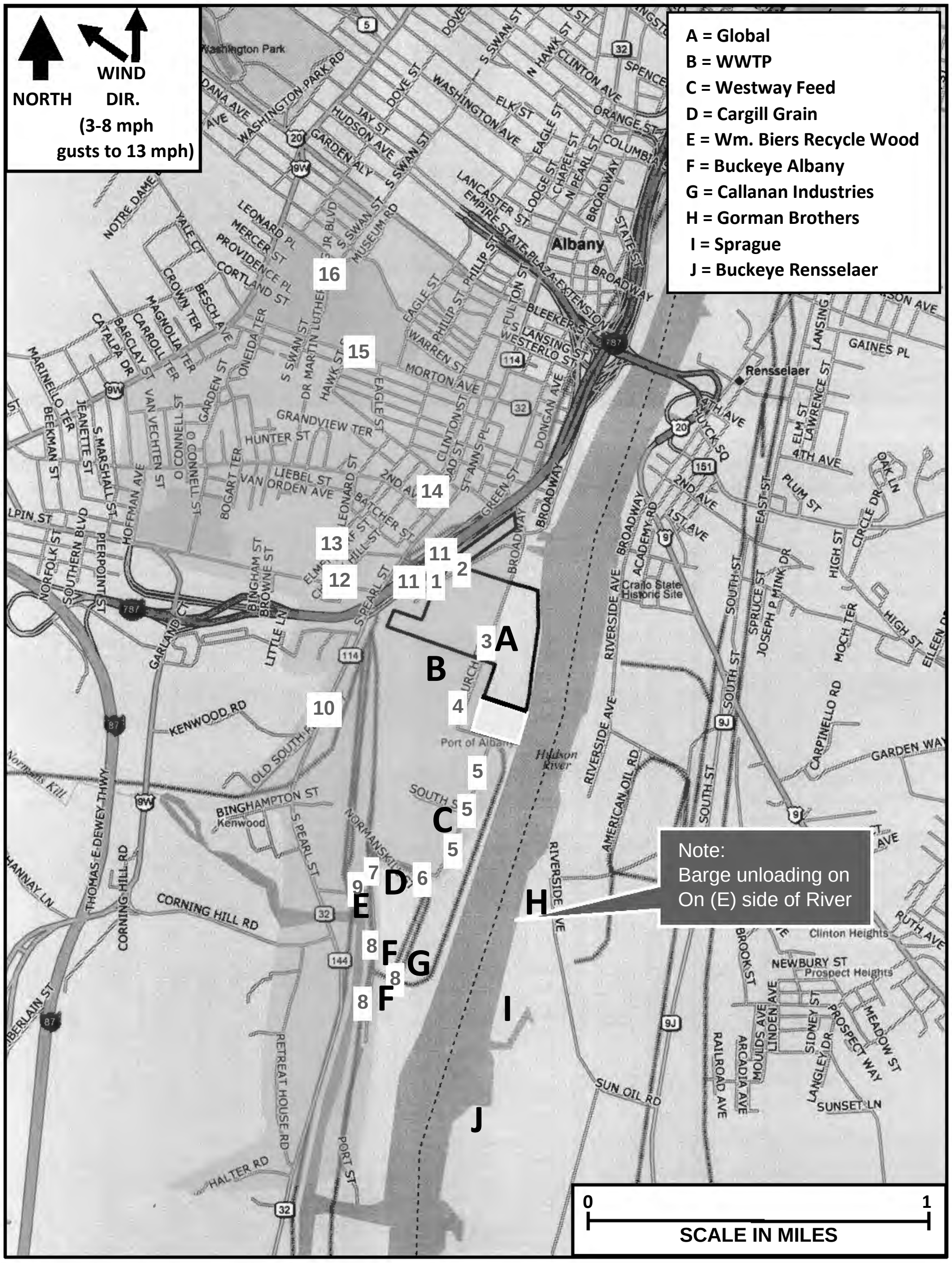
loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	1.0-1.5	<2-2	sewage, sulfur, H_2S	B	6	1.0	<2	cooked grain	D
2	2.0-3.0	15-31	sweet/sour molasses	C	7	1.0-1.5	<2	petroleum/asphalt	G
3	0.25	<2	sewage	B	8	0.5-1.5	<2-2	sour garbage	County Waste Recycle
4	1.0-3.0	2-31	woodchips, mulch	E	9	1.0-1.75	<2-2	wood smoke	local homes
5	0.5-1.0	<2	molasses	C					
Wind: NE-NNE, 2-6 mph, gusts 9 mph, 61^0F, 25% cloud cover, mostly clear									

Figure 3-14. Community odor survey No. 10 (09/12/2019 20:30-22:00)



loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.5-1.0	<2	petroleum	oil truck	6	0.25	<2	light metallic	scrap yard
2	0.25	<2	petroleum/oily	oil truck	7	0.5-1.0	<2	wood chips/sour grain/meal	E/D
3	0.5-1.0	<2	petroleum/gasoline	G	8	0.5-1.0	<2	petroleum/asphalt	F
4	0.25-0.5	<2	asphalt/rotten grain	G/D	9	0.5	<2	petroleum/asphalt	F
5	0.5-2.0	2-7	petroleum/asphalt/oily/ food	F/D	10	1.0-1.5	<2	asphalt	road repair
Wind: NE-ENE, 0-3 mph, 58^{0}F, 25% cloud cover, mostly sunny									

Figure 3-15. Community odor survey No. 11 (09/13/2019 08:30-10:15)



loc.	int.	d/t	character	source	loc.	int.	d/t	character	source
1	0.5-1.5	<2-2	sewage/gasoline	B/A	9	1.5-3.0	2-31	wood chips/mulch	E
2	1.0	<2	gasoline/petroleum	A	10	0.5-1.0	<2	sour petroleum	H
3	0.5-1.5	<2	gas/petroleum/sulfur	A/H?	11	0.5-2.0	2-7	sewage	B
4	0.5-1.0	<2	gas/petroleum	H	12	0.5-1.0	<2	sewage	B
5	1.0-1.5	<2-2	sulfur/asphalt	H/F	13	0.25	<2	sour petroleum	H
6	1.0-1.5	<2-2	rancid grain/meal	D	14	0.5	<2	sewage	B
7	0.5-1.5	<2	sour grain/meal	D	15	0.5	<2	petroleum	H
8	1.0-4.0	2-170	asphalt/petroleum/sharp	F	16	0.5	<2	petroleum	H
Wind: S-ESE, 3-8 mph, gusts 13 mph, 72^{0}F, 40% cloud cover, mostly sunny									

Figure 3-16. Community odor survey No. 12 (09/13/2019 14:20-17:00)

Attachment G

Global Noise Study

December 12, 2019

Ms. Gianna Aiezza, P.E.
Principal Engineer
Envirospec Engineering, PLLC.
349 Northern Blvd.
Albany, New York 12204

Subject: Baseline Environmental Nosie Study – Summary Report
Global Companies-Port of Albany
JMT Project No. 19-01944

Dear Ms. Aiezza:

This letter report summarizes the findings of the Baseline Environmental Noise Study conducted by JMT of New York, Inc. (JMT) for Global Companies' (Global) Port of Albany terminal. Global is a facility that is in operation 24 hours a day, 7 days a week. JMT conducted two, 24-hour baseline monitoring events on October 14-15, 2019 and October 23-24, 2019. Monitoring protocol and study results are described below. Contained within Appendix A are the sound level meter location map, detailed summary noise results presented in Table 1, and transcribed field notes and photographs of monitoring locations. Appendix B contains tabulated sound level meter data output tables.

PROTOCOL

JMT monitored five (5) locations during the study, as depicted on the attached Figure 1 and as described below:

Location 1	Albany Housing Authority - Ezra Prentice Homes – Park
Location 2	Albany Housing Authority - Ezra Prentice Homes – Yard
Location 3	Global Companies Terminal – Rail Siding
Location 4	Global Companies Terminal – Westernmost Tank
Location 5	Global Companies Terminal – Main Facility (Truck Rack)

Meters were pre-programmed to monitor several sound parameters, and to record observations at five (5) minute intervals for a period of 24-hours. Microphone height was set at approximately 5.0 feet above ground. The Photographic Log (see Appendix A) shows the setup of each sound level meter.

Field staff noted the predominant sound source at all locations to be vehicular traffic. At Location 5, this included on-site traffic and distant highway traffic. At all other locations, the predominant sound source noted was highway traffic associated with Interstate 787 (I-787) and, to a lesser extent, NYS Route 32. Additional sources of sound associated with nearby transportation and utility construction activities were noted at Location 1.

Locations 1 and 2 provided monitoring results for two, 24-hour data series. Locations 3, 4 and 5 provided reliable results for approximately 17 hours each, including daytime and overnight observations. Each location provided statistically valid results for both daytime and nighttime environmental sound levels.

19 British American Boulevard Latham, NY 12110 (518) 782-0882 www.jmt.com

RESULTS

Table 1 presents the observed results of the study in LAeq and Lmax for the length of the test, and for day and night periods. LAeq is defined as the A-weighted[1] equivalent continuous sound level in decibels measured over the stated time period. In more simplified terms, LAeq is analogous to the “average” sound level for a given period, tailored to human hearing. Lmax is the maximum observed sound level during the stated time period. LAeq and Lmax are useful in discussion of environmental noise as they provide “average” and maximum sound levels, respectively, for a given period of observation, or a subset of that period, regardless of recording interval. Appendix B contains additional metrics, including percentile (Ln) metrics. Percentile metrics are useful in describing environmental noise over the recording interval (5 minutes in this study); however, they cannot be averaged over larger periods, and are therefore excluded from Appendix A, Table 1.

Detailed results are provided in Appendix A, Table 1, and a full record of recorded data is provided in Appendix B. In general, recorded “average” ambient sound levels (LAeq) ranged from a low of approximately 55.5 dB(A) near the Ezra Prentice Homes during night hours, to a high of approximately 68.8 dB(A) during daytime hours, also at the Ezra Prentice Homes. These results are consistent with urban and commercial areas per the Federal Highway Administration document, *Techniques for Reviewing Noise Analyses and Associated Noise Reports*. These levels are also consistent with residential areas proximal to highways.

In general, while there is some variability, LAeq levels recorded at the Ezra Prentice Homes and within Global’s facility are effectively identical. LAeq values observed at Location 5, which is at the core of Global’s facility operation were below values observed at Location 2 at Ezra Prentice Homes for day, night, and combined monitoring periods. These results support anecdotal observations from the field staff that highway traffic is the predominant source of environmental sound in the area, including at Ezra Prentice Homes. From a sound projection standpoint, these results also make sense, as sound levels decay with distance from a sound source in general accordance with the inverse square law. Global’s primary focus of activity, represented by Location 5, is approximately 2,000 feet from Locations 1 and 2. At this distance, contributions to observed sound levels at the Ezra Prentice Homes from Global’s focus of operations would be minimal.

Observed Lmax values further indicate that Global’s Port of Albany facility has little to no impact on surrounding sound levels. In all cases, based on timing of the recorded Lmax for the observation period, Lmax values observed within Global’s facility did not correlate to Lmax values observed outside the facility. Even within Global’s facility, there was no correlation between Lmax timing.

If you have any questions or need further information, please do not hesitate to contact me at 518-218-5949 or by email at cminkler@jmt.com, or Ed Davidson, Project Manager, at edavidson@jmt.com.

Sincerely,
JMT of New York, Inc.

Christina M. Minkler, PE
Vice President
CMM/egd

[1] A-weighting is a frequency weighting formula/filter that correlates well with human perceptions of loudness by “weighting” sound level observations based on their frequency when calculating a single, combined sound level.

APPENDIX A

NOISE MONITORING SITE MAP

SUMMARY NOISE RESULTS

PHOTO LOG

FIELD NOTES

LEGEND

APPROXIMATE SITE LOCATION

ALBANY HOUSING AUTHORITY

1 NOISE MONITORING LOCATIONS (APPROX.)

JMT
19 British American Blvd.,Latham, New York 12110
P: (518) 782-0882 F: (518) 782-0973 www.jmt.com

NOISE MONITORING LOCATIONS
GLOBAL COMPANIES, LLC.
PORT OF ALBANY

TOWN OF ALBANY — ALBANY CO., NY

PROJ. #:	19-01944	DATE:	12/04/2019	SCALE:	1"=600'	DWG. NO.	19-01944C	FIGURE	1

JMT of New York, Inc.

Baseline Environmental Noise Study - Global Companies - Port of Albany

TABLE 1 - SUMMARY NOISE RESULTS

Location ID	Meter ID	Test #	Start Time	End Time	Total Hours	Overall		Day (6 AM - 8 PM)*			Night (8 PM - 6 AM)*		
						LAeq	Lmax	LAeq	Lmax	Lmax Time	LAeq	Lmax	Lmax Time
1	C	1	10/14/19 18:00	10/15/19 18:00	24	61.0	92.7	62.8	92.7	10/15 06:40	55.5	82.8	10/14 21:10
2	E	1	10/14/19 18:00	10/15/19 18:00	24	59.8	94.1	59.9	92.5	10/14 19:10	59.6	94.1	10/14 21:40
1	C	2	10/23/19 12:00	10/24/19 12:00	24	60.8	91.1	61.7	91.1	10/23 18:40	59.1	89.5**	10/24 05:25
2	E	2	10/23/19 12:00	10/24/19 12:00	24	67.5	102.6	68.8	102.1	10/24 11:35	64.8	102.6**	10/24 05:20
3	B	2	10/23/19 12:00	10/24/19 4:35	16.6	61.9	88.3	62.7	83.7	10/23 18:05	61.0	88.3	10/23 20:10
4	A	2	10/23/19 12:00	10/24/19 5:30	17.5	66.9	101.8	66.6	101.8	10/23 16:30	67.2	95.1	10/23 22:35
5	Rental	2	10/23/19 12:00	10/24/19 4:35	16.6	63.5	93.2	64.7	93.2	10/23 13:35	62.1	85.1	10/23 23:50

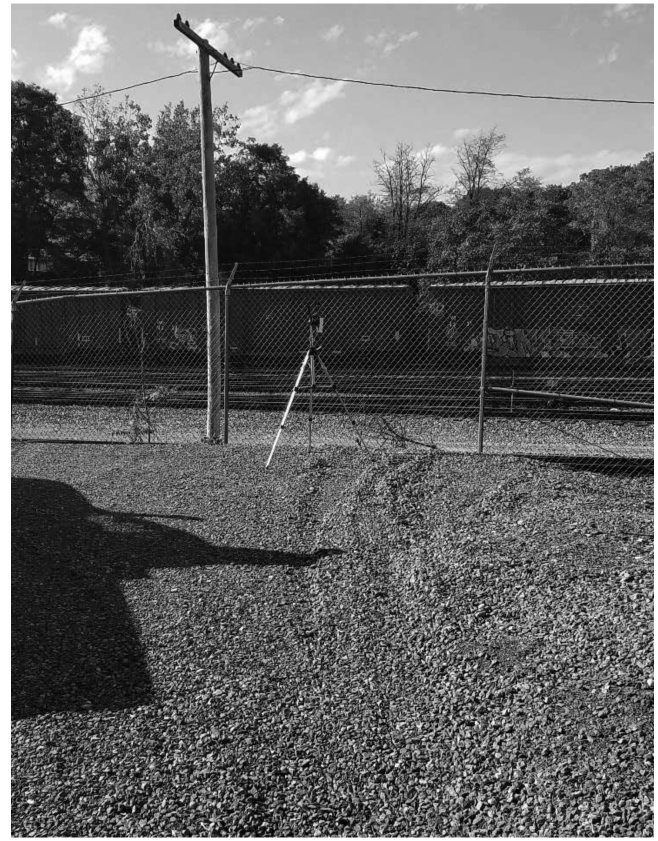
*Locations 3, 4 and 5 did not observe the full period; parameters reflect hours monitored during each respective period.

**Lmax at Locations 1 and 2 occurred outside recorded period of Locations 3, 4 and 5. Adjusting "Night" period to end at 4:35 AM for all Locations results in Lmax values of 79.7 at Location 1 and 84.4 at Location 2, occurring at 10/23 22:00 and 10/24 04:15, respectively.

Location 1 – Facing East

Location 2 – Facing Southeast

Location 3 - Facing West



Location 4 – Facing West

Location 5 - Facing Northeast

JMT of New York, Inc.

Baseline Environmental Noise Study

Global Companies – Port of Albany

Transcribed Field Notes

<u>10/14/19-</u>

KO,ED,DS, Darren & Nicole onsite at 14:00.

Set up Location 5- 005

Calibration: 92.8

14:20- Set time 10/14 18:00:00 to 10/15 18:00:00

Set up Location 3-003

Calibration: 92.8

14:40- Set time 10/14 18:00:00 to 10/15 18:00:00

Set up Location 4

Set up Location 1

Location moved to playground fence, located behind garbage area

Set up Location 2

Location moved to telephone pole.

<u>10/15/19-</u>

KO, DS onsite 17:50.

17:56 Location 5 picked up

18:15 Location 3 picked up

Meter knocked over down small embankment.

Reset to 18:20-08:00

18:25 Location 4 picked up

Meter A shut off due to low battery

Replaced with rental unit

Reset to 18:25-08:00

18:40 Location 1 picked up

Meter post calibrated

18:45 Location 2 picked up

Meter post calibrated

10/23/19

KO and AR onsite 10:15 am. Global employee escorts KO and AR to Locations 5 and Location 3 on Global site.

Global Sample Locations:

Location 5- Rental Meter

Data File: 0508

Set to Record 10/23 12:00:00 to 10/24 12:00:00

Location 3- Meter B

Data File: 0305

Set to Record 10/23 12:00:00 to 10/24 12:00:00

Location 4- Meter A

Set to Record 10/23 12:00:00 to 10/24 12:00:00

Housing Association:

Location 1- Meter C

Set to Record 10/23 12:00:00 to 10/24 12:00:00

Location 2- Meter D

Set to Record 10/23 12:00:00 to 10/24 12:00:00

10/24/19-

KO arrives onsite at approximately 12:30 pm to collect noise meters.

All meters were in correct positions and appeared to be undisturbed when meters were collected.

APPENDIX B
TABULATED NOISE DATA

METROSONICS db-3080 SN 1430 V1.20 TEST: 2 OF 2

REPORT PRINTED 10/31/19 AT 14:11:01

USER ID: 000001

____

____

____

____

____

EXCHANGE RATE: 3dB FILTER: A WT.
DOSE CRITERION: 90dB RESPONSE: SLOW
DOSE LENGTH: 8 hours

PRE-CALIBRATION TIME: N/A
PRE-CALIBRATION RANGE: 39.9dBA TO 139.9dBA

____

POST-CALIBRATION TIME: 10/31/19 AT 14:00:02
POST-CALIBRATION RANGE: 39.8dBA TO 139.8dBA

____

TEST STARTED: 10/23/19 AT 12:00:00
TEST LENGTH: 01 DAYS 00:00:00
TEST ENDED: 10/24/19 AT 12:00:00
TIME HISTORY INTERVAL: 00:05:00

Lavg......... 60.8dBA
Lavg (80)... 48.3dBA
Lavg (90)... 39.9dBA
SEL.......... 110.0dBA

TWA.......... 65.6dBA
TWA (80)... 53.1dBA
TWA (90)... 41.7dBA

Lmax: 91.1dBA ON 10/23/19 AT 18:43:58
Lpk: 128.4dBC ON 10/23/19 AT 18:58:53
TIME OVER 66dBA 00 DAYS 00:50:11.36

DOSE (80)............. 0.01%
PROJ. DOSE (80)....... > 8 HRS.
DOSE (90)............. 0.00%
PROJ. DOSE (90)....... > 8 HRS.

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	tBA ? ?	dzC	? t{A ¿ ¿	¿g{}íêíë10/23/19
12:00:00	61.7	76.1	<110.2	61	56
12:05:00	60.2	70.9	<110.2	62	55
12:10:00	65.1	80.8	<110.2	65	56
12:15:00	59.7	68.1	<110.2	61	56
12:20:00	60.9	71.1	<110.2	64	54
12:25:00	61.8	76.7	<110.2	63	57
12:30:00	59.3	63.5	<110.2	61	57
12:35:00	61.2	68.2	<110.2	63	57
12:40:00	62.3	72.0	<110.2	65	57
12:45:00	59.7	65.3	<110.2	62	56
12:50:00	62.2	73.7	<110.2	64	56
12:55:00	61.3	71.6	<110.2	63	57
13:00:00	60.3	68.9	<110.2	62	56
13:05:00	61.0	67.9	<110.2	63	58
13:10:00	60.1	67.3	<110.2	62	56
13:15:00	61.3	69.8	<110.2	63	57
13:20:00	62.2	75.2	<110.2	62	56
13:25:00	62.1	71.4	<110.2	65	57
13:30:00	61.0	67.0	<110.2	63	58
13:35:00	61.6	73.4	<110.2	64	57
13:40:00	63.4	79.1	<110.2	62	56
13:45:00	61.3	71.4	<110.2	64	57
13:50:00	60.2	68.7	<110.2	62	56
13:55:00	63.2	76.3	<110.2	66	57
14:00:00	60.5	68.5	<110.2	63	56
14:05:00	59.5	66.0	<110.2	61	57
14:10:00	61.0	69.4	<110.2	63	56
14:15:00	60.5	66.5	<110.2	63	56
14:20:00	60.3	66.8	<110.2	63	56
14:25:00	60.5	68.1	<110.2	63	56
14:30:00	59.8	65.6	<110.2	61	57
14:35:00	62.2	78.9	<110.2	63	56
14:40:00	60.9	69.4	<110.2	62	57
14:45:00	59.2	66.4	<110.2	61	56
14:50:00	60.1	67.1	<110.2	61	57
14:55:00	60.2	66.5	<110.2	61	57
15:00:00	60.6	67.8	<110.2	62	57

15:05:00	62.0	67.9	<110.2	64	59
15:10:00	60.8	67.2	<110.2	63	58
15:15:00	61.0	72.9	<110.2	63	58
15:20:00	61.3	73.5	<110.2	62	57
15:25:00	61.9	73.5	<110.2	63	59
15:30:00	60.9	65.3	<110.2	63	58
15:35:00	61.3	69.1	<110.2	62	59
15:40:00	61.5	69.6	<110.2	63	58
15:45:00	61.2	73.5	<110.2	62	57
15:50:00	61.2	70.0	<110.2	63	58
15:55:00	61.3	70.9	<110.2	63	58

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dzA	tB{	dBA	dBA
í 16:00:00	59.5	63.5	<110.2	60	57
16:05:00	60.9	67.4	<110.2	62	58
16:10:00	61.1	68.3	<110.2	63	58
16:15:00	60.8	66.0	<110.2	62	58
16:20:00	61.8	71.7	<110.2	63	58
16:25:00	61.9	73.1	<110.2	63	59
16:30:00	61.9	74.7	<110.2	63	59
16:35:00	61.3	72.3	<110.2	63	57
16:40:00	60.8	68.5	<110.2	62	58
16:45:00	60.9	70.3	<110.2	63	58
16:50:00	59.9	64.9	<110.2	61	58
16:55:00	61.2	76.0	<110.2	63	57
17:00:00	61.3	73.3	<110.2	63	57
17:05:00	61.5	71.1	<110.2	63	58
17:10:00	62.1	73.3	<110.2	63	58
17:15:00	60.3	69.9	<110.2	61	57
17:20:00	59.5	63.7	<110.2	60	57
17:25:00	58.9	63.1	<110.2	60	57
17:30:00	61.4	75.1	<110.2	61	57
17:35:00	61.3	76.0	<110.2	63	57
17:40:00	59.4	63.3	<110.2	61	56
17:45:00	58.9	62.7	<110.2	60	56
17:50:00	59.6	65.2	<110.2	60	57
17:55:00	61.2	72.3	<110.2	62	57
18:00:00	59.2	66.9	<110.2	61	56
18:05:00	62.4	73.1	<110.2	65	58
18:10:00	60.4	67.4	<110.2	61	58
18:15:00	58.8	62.5	<110.2	60	56
18:20:00	61.5	74.0	<110.2	62	58
18:25:00	59.2	65.9	<110.2	60	57

18:30:00	59.4	65.0	<110.2	60	57
18:35:00	59.4	62.9	<110.2	60	58
18:40:00	68.5	91.1	128.4	68	59
18:45:00	60.9	77.7	<110.2	60	57
18:50:00	62.6	77.6	<110.2	65	58
18:55:00	70.0	90.3	128.4	70	59
19:00:00	59.3	64.0	<110.2	61	57
19:05:00	58.8	69.5	<110.2	59	56
19:10:00	59.3	66.7	<110.2	61	56
19:15:00	59.0	63.8	<110.2	60	57
19:20:00	59.3	66.7	<110.2	61	56
19:25:00	58.0	67.3	<110.2	59	55
19:30:00	58.5	69.5	<110.2	59	55
19:35:00	62.6	73.3	<110.2	65	58
19:40:00	57.9	62.2	<110.2	59	55
19:45:00	57.7	64.3	<110.2	59	55
19:50:00	57.7	64.7	<110.2	60	55
19:55:00	60.9	69.5	<110.2	64	55

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	?dzA	dCC ?	¿tB}	¿¿tz}íëíë20:00:00 60.0 75.3 <110.2 63 54
20:05:00	56.7	64.5	<110.2	59	53
20:10:00	58.9	69.3	<110.2	61	54
20:15:00	57.3	62.3	<110.2	59	53
20:20:00	56.2	63.3	<110.2	58	53
20:25:00	57.4	65.8	<110.2	59	54
20:30:00	55.7	61.9	<110.2	57	52
20:35:00	55.8	62.0	<110.2	57	53
20:40:00	55.9	63.5	<110.2	58	52
20:45:00	58.1	69.3	<110.2	59	53
20:50:00	56.7	65.9	<110.2	58	53
20:55:00	56.5	63.4	<110.2	58	53
21:00:00	58.1	65.5	<110.2	61	53
21:05:00	55.9	60.3	<110.2	57	54
21:10:00	55.9	62.2	<110.2	57	53
21:15:00	55.1	61.5	<110.2	57	51
21:20:00	54.7	59.7	<110.2	56	52
21:25:00	54.9	60.3	<110.2	56	51
21:30:00	56.1	62.8	<110.2	57	54
21:35:00	54.8	63.6	<110.2	56	52
21:40:00	56.0	64.3	<110.2	57	53
21:45:00	56.1	64.7	<110.2	57	52
21:50:00	62.1	71.5	<110.2	66	53
21:55:00	55.2	60.8	<110.2	57	53

22:00:00	65.7	79.7	<110.2	65	58
22:05:00	57.9	68.0	<110.2	63	51
22:10:00	59.1	66.1	<110.2	62	52
22:15:00	60.3	67.2	<110.2	63	52
22:20:00	56.2	67.8	<110.2	58	50
22:25:00	56.8	67.9	<110.2	59	51
22:30:00	59.9	67.8	<110.2	63	51
22:35:00	64.0	72.3	<110.2	67	58
22:40:00	55.8	61.6	<110.2	58	53
22:45:00	63.5	73.2	<110.2	67	53
22:50:00	56.3	64.1	<110.2	61	51
22:55:00	54.6	61.7	<110.2	56	51
23:00:00	56.8	71.2	<110.2	56	51
23:05:00	54.3	63.2	<110.2	57	50
23:10:00	54.9	64.5	<110.2	57	50
23:15:00	53.5	57.9	<110.2	55	51
23:20:00	54.6	64.4	<110.2	57	51
23:25:00	54.3	62.6	<110.2	56	51
23:30:00	53.0	59.1	<110.2	55	50
23:35:00	53.9	61.2	<110.2	57	50
23:40:00	54.2	63.0	<110.2	57	49
23:45:00	64.1	76.9	<110.2	68	51
23:50:00	56.4	67.9	<110.2	59	50
23:55:00	57.9	68.1	<110.2	61	50

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dzA	dzA ? ?	gBC? ?	wBA ¿ ¿	¿dzAí íê10/24/19
00:00:00	64.4	75.5	<110.2	68	50
00:05:00	53.9	60.8	<110.2	56	50
00:10:00	63.0	75.1	<110.2	66	51
00:15:00	60.4	70.7	<110.2	65	50
00:20:00	53.8	64.0	<110.2	56	49
00:25:00	52.3	60.0	<110.2	54	49
00:30:00	52.7	62.0	<110.2	54	49
00:35:00	52.0	59.5	<110.2	54	48
00:40:00	51.9	61.0	<110.2	53	48
00:45:00	56.9	70.0	<110.2	61	50
00:50:00	56.6	67.3	<110.2	60	51
00:55:00	59.9	66.9	<110.2	63	52
01:00:00	60.1	75.1	<110.2	64	52
01:05:00	60.1	69.3	<110.2	64	51
01:10:00	57.0	66.6	<110.2	61	50
01:15:00	52.1	59.1	<110.2	54	49
01:20:00	53.0	67.3	<110.2	54	50

01:25:00	50.9	55.3	<110.2	52	49
01:30:00	51.8	58.3	<110.2	54	48
01:35:00	52.0	58.1	<110.2	53	49
01:40:00	55.2	64.0	<110.2	58	50
01:45:00	51.9	60.3	<110.2	53	49
01:50:00	53.0	62.5	<110.2	55	49
01:55:00	51.9	55.6	<110.2	53	50
02:00:00	52.9	59.5	<110.2	54	50
02:05:00	56.7	76.5	<110.2	57	50
02:10:00	59.5	78.4	<110.2	57	49
02:15:00	52.4	59.3	<110.2	54	49
02:20:00	53.0	59.0	<110.2	55	50
02:25:00	53.7	60.8	<110.2	55	51
02:30:00	54.6	62.9	<110.2	57	51
02:35:00	53.2	62.0	<110.2	55	50
02:40:00	54.1	63.5	<110.2	56	50
02:45:00	54.4	63.1	<110.2	57	51
02:50:00	52.1	57.5	<110.2	55	49
02:55:00	52.7	59.2	<110.2	54	49
03:00:00	51.9	57.9	<110.2	54	49
03:05:00	53.2	58.1	<110.2	55	50
03:10:00	53.3	62.7	<110.2	55	50
03:15:00	52.4	59.4	<110.2	54	50
03:20:00	54.7	66.9	<110.2	56	51
03:25:00	55.5	63.6	<110.2	57	52
03:30:00	54.1	60.3	<110.2	55	52
03:35:00	55.5	62.9	<110.2	57	50
03:40:00	54.6	63.2	<110.2	56	50
03:45:00	56.4	66.4	<110.2	59	52
03:50:00	54.3	63.6	<110.2	56	51
03:55:00	54.3	66.6	<110.2	56	50

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dzA	dCC	¿tB} ?¿¿¿¿t{Aíëíë04:00:00 53.5 64.3 <110.2 55 50	
04:05:00	56.7	71.3	<110.2	59	50
04:10:00	55.0	65.6	<110.2	57	51
04:15:00	53.7	63.9	<110.2	56	49
04:20:00	53.9	60.7	<110.2	56	50
04:25:00	58.4	74.7	<110.2	57	50
04:30:00	52.8	59.9	<110.2	55	50
04:35:00	54.5	63.2	<110.2	57	50
04:40:00	55.4	66.4	<110.2	57	50
04:45:00	53.3	57.5	<110.2	55	50
04:50:00	53.0	59.6	<110.2	55	50

04:55:00	54.8	62.8	<110.2	57	52
05:00:00	60.3	73.6	<110.2	64	51
05:05:00	58.0	64.7	<110.2	60	53
05:10:00	56.2	62.8	<110.2	58	53
05:15:00	56.5	67.1	<110.2	59	52
05:20:00	71.8	85.3	<110.2	75	55
05:25:00	71.1	89.5	<110.2	75	53
05:30:00	57.5	67.8	<110.2	60	52
05:35:00	65.0	78.9	<110.2	68	55
05:40:00	66.7	80.3	<110.2	69	58
05:45:00	58.9	70.1	<110.2	62	53
05:50:00	58.9	67.8	<110.2	61	54
05:55:00	57.3	64.5	<110.2	59	54
06:00:00	59.3	77.6	<110.2	59	55
06:05:00	59.5	77.1	<110.2	60	54
06:10:00	59.8	67.1	<110.2	62	56
06:15:00	59.1	66.7	<110.2	61	56
06:20:00	59.6	67.5	<110.2	62	55
06:25:00	59.4	64.3	<110.2	61	57
06:30:00	61.9	76.3	<110.2	63	57
06:35:00	62.4	69.5	<110.2	65	59
06:40:00	62.7	73.6	<110.2	64	59
06:45:00	60.6	66.7	<110.2	62	58
06:50:00	64.6	82.9	<110.2	65	59
06:55:00	61.5	77.6	<110.2	63	58
07:00:00	63.6	73.3	<110.2	67	58
07:05:00	60.8	69.8	<110.2	62	57
07:10:00	61.3	65.2	<110.2	63	59
07:15:00	61.9	69.7	<110.2	64	59
07:20:00	62.4	74.2	<110.2	64	58
07:25:00	62.2	69.9	<110.2	63	59
07:30:00	62.0	68.9	<110.2	63	59
07:35:00	62.2	73.5	<110.2	63	59
07:40:00	65.6	77.9	<110.2	67	60
07:45:00	62.3	68.9	<110.2	64	60
07:50:00	61.9	70.7	<110.2	64	59
07:55:00	62.7	69.0	<110.2	65	60

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	?dBA	dzC ¿	tC}	tz}íëíë08:00:00 62.4 74.2 <110.2 64 60
08:05:00	61.6	68.1	<110.2	64	58
08:10:00	62.9	70.8	<110.2	65	59
08:15:00	62.9	77.0	<110.2	63	59
08:20:00	61.0	65.8	<110.2	63	58

08:25:00	61.3	67.8	<110.2	63	59
08:30:00	63.3	82.1	<110.2	64	57
08:35:00	63.8	72.1	<110.2	66	58
08:40:00	64.1	81.2	<110.2	63	58
08:45:00	63.1	78.5	<110.2	65	58
08:50:00	61.7	76.8	<110.2	62	57
08:55:00	61.6	73.1	<110.2	63	58
09:00:00	60.1	73.4	<110.2	61	57
09:05:00	60.1	65.7	<110.2	62	56
09:10:00	59.7	66.8	<110.2	61	56
09:15:00	59.5	66.2	<110.2	62	56
09:20:00	66.8	75.6	<110.2	71	57
09:25:00	59.8	65.2	<110.2	62	56
09:30:00	59.6	67.6	<110.2	62	56
09:35:00	58.6	65.1	<110.2	60	56
09:40:00	60.2	71.0	<110.2	61	56
09:45:00	59.9	72.7	<110.2	62	55
09:50:00	60.1	69.6	<110.2	63	55
09:55:00	60.7	68.3	<110.2	64	55
10:00:00	58.9	66.0	<110.2	61	55
10:05:00	59.7	70.4	<110.2	61	56
10:10:00	58.6	64.9	<110.2	61	55
10:15:00	59.3	68.4	<110.2	61	55
10:20:00	59.7	64.8	<110.2	61	57
10:25:00	58.9	70.4	<110.2	60	55
10:30:00	58.8	65.4	<110.2	61	55
10:35:00	62.6	78.7	<110.2	62	54
10:40:00	60.0	74.0	<110.2	62	55
10:45:00	61.4	71.8	<110.2	63	57
10:50:00	66.3	73.5	<110.2	70	58
10:55:00	66.2	72.0	<110.2	69	60
11:00:00	63.7	73.1	<110.2	66	55
11:05:00	59.0	66.9	<110.2	61	55
11:10:00	59.5	66.4	<110.2	62	55
11:15:00	63.2	77.5	<110.2	65	55
11:20:00	59.2	67.5	<110.2	61	55
11:25:00	59.4	67.9	<110.2	62	55
11:30:00	62.1	70.9	<110.2	64	59
11:35:00	69.0	78.8	<110.2	72	62
11:40:00	65.3	79.1	<110.2	67	56
11:45:00	61.7	72.7	<110.2	65	56
11:50:00	59.3	67.7	<110.2	62	55
11:55:00	59.0	68.4	<110.2	61	55

REPORT PRINTED 10/31/19 AT 14:11:32

USER ID: 000001

EXCHANGE RATE: 3dB FILTER: A WT.
DOSE CRITERION: 90dB RESPONSE: SLOW
DOSE LENGTH: 8 hours

PRE-CALIBRATION TIME: N/A
PRE-CALIBRATION RANGE: 39.9dBA TO 139.9dBA

POST-CALIBRATION TIME: 10/15/19 AT 18:41:42
POST-CALIBRATION RANGE: 39.8dBA TO 139.8dBA

TEST STARTED: 10/14/19 AT 18:00:00
TEST LENGTH: 01 DAYS 00:00:00
TEST ENDED: 10/15/19 AT 18:00:00
TIME HISTORY INTERVAL: 00:05:00

Lavg......... 61.0dBA
Lavg (80)... 52.0dBA
Lavg (90)... 47.3dBA
SEL.......... 110.2dBA

TWA.......... 65.8dBA
TWA (80)... 56.8dBA
TWA (90)... 52.1dBA

Lmax: 92.7dBA ON 10/15/19 AT 06:43:15
Lpk: 116.6dBC ON 10/15/19 AT 14:20:45
TIME OVER 66dBA 00 DAYS 00:50:29.60

DOSE (80)............. 0.04%
PROJ. DOSE (80)....... > 8 HRS.
DOSE (90)............. 0.01%
PROJ. DOSE (90)....... > 8 HRS.

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	wB{ ? ¿ dB}		¿t{}íêíë10/14/19
18:00:00	63.4	72.4	<110.2	66	59
18:05:00	61.4	68.7	<110.2	63	58
18:10:00	63.6	77.6	<110.2	63	58
18:15:00	61.1	70.5	<110.2	63	57
18:20:00	60.1	72.7	<110.2	61	57
18:25:00	58.3	62.2	<110.2	60	56
18:30:00	58.9	68.7	<110.2	61	55
18:35:00	58.8	64.3	<110.2	60	56
18:40:00	60.5	74.0	<110.2	62	55
18:45:00	60.5	67.8	<110.2	63	56
18:50:00	57.9	64.8	<110.2	59	55
18:55:00	57.8	61.9	<110.2	59	55
19:00:00	58.9	74.4	<110.2	59	54
19:05:00	57.6	65.6	<110.2	58	55
19:10:00	58.9	66.7	<110.2	60	56
19:15:00	60.9	78.3	<110.2	61	56
19:20:00	59.1	64.8	<110.2	61	56
19:25:00	58.8	65.0	<110.2	60	56
19:30:00	58.0	64.7	<110.2	59	56
19:35:00	56.9	64.7	<110.2	58	54
19:40:00	64.4	76.7	<110.2	68	57
19:45:00	58.9	64.7	<110.2	60	55
19:50:00	56.5	60.3	<110.2	58	54
19:55:00	58.0	66.5	<110.2	59	54
20:00:00	59.1	70.8	<110.2	59	55
20:05:00	57.2	60.7	<110.2	59	55
20:10:00	63.1	82.8	<110.2	61	54
20:15:00	58.4	65.9	<110.2	61	54
20:20:00	57.0	62.9	<110.2	59	54
20:25:00	56.3	61.4	<110.2	58	53
20:30:00	57.8	61.6	<110.2	59	54
20:35:00	57.7	73.5	<110.2	58	53
20:40:00	59.5	74.7	<110.2	61	54
20:45:00	56.4	61.5	<110.2	57	54
20:50:00	58.3	72.1	<110.2	60	54
20:55:00	55.5	59.4	<110.2	57	53
21:00:00	56.2	66.9	<110.2	58	52
21:05:00	55.3	64.9	<110.2	57	52
21:10:00	55.8	64.8	<110.2	57	52
21:15:00	54.5	65.5	<110.2	55	52
21:20:00	54.2	59.9	<110.2	55	51
21:25:00	55.3	60.7	<110.2	57	52
21:30:00	55.0	69.6	<110.2	56	52
21:35:00	55.5	62.7	<110.2	57	52
21:40:00	57.4	70.5	<110.2	60	51

21:45:00	64.7	75.4	<110.2	67	54
21:50:00	61.6	76.3	<110.2	64	50
21:55:00	53.3	58.7	<110.2	55	50

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	?tzC ?	wzA ??	wzAíêíë22:00:00 62.0 76.3 <110.2 67 52
22:05:00	53.3	59.6	<110.2	55	51
22:10:00	52.9	57.5	<110.2	54	50
22:15:00	52.8	58.4	<110.2	55	50
22:20:00	54.1	62.8	<110.2	56	50
22:25:00	53.0	60.9	<110.2	55	49
22:30:00	54.3	63.5	<110.2	56	50
22:35:00	52.2	57.5	<110.2	54	49
22:40:00	53.8	59.5	<110.2	56	50
22:45:00	53.5	61.5	<110.2	55	49
22:50:00	58.5	77.5	<110.2	60	49
22:55:00	55.5	67.1	<110.2	57	51
23:00:00	53.1	59.5	<110.2	56	48
23:05:00	57.0	72.3	<110.2	59	50
23:10:00	52.8	58.4	<110.2	54	49
23:15:00	60.3	76.4	<110.2	59	50
23:20:00	54.0	61.7	<110.2	56	50
23:25:00	58.7	77.6	<110.2	60	50
23:30:00	54.2	65.1	<110.2	57	47
23:35:00	53.7	72.2	<110.2	54	47
23:40:00	52.6	62.0	<110.2	55	47
23:45:00	52.0	61.8	<110.2	54	47
23:50:00	52.0	62.7	<110.2	55	46
23:55:00	57.4	74.4	<110.2	55	47
10/15/19					
00:00:00	51.0	59.1	<110.2	55	46
00:05:00	52.9	60.7	<110.2	55	49
00:10:00	52.6	58.8	<110.2	54	49
00:15:00	52.6	62.4	<110.2	55	49
00:20:00	53.0	64.5	<110.2	56	49
00:25:00	50.2	54.6	<110.2	52	48
00:30:00	52.7	63.5	<110.2	55	48
00:35:00	50.0	55.1	<110.2	51	48
00:40:00	53.9	69.5	<110.2	56	49
00:45:00	50.7	58.3	<110.2	52	47
00:50:00	51.5	61.5	<110.2	53	47
00:55:00	50.7	57.8	<110.2	54	45
01:00:00	49.2	59.6	<110.2	51	44
01:05:00	50.1	56.5	<110.2	53	44

01:10:00	48.1	54.5	<110.2	51	44
01:15:00	51.0	57.5	<110.2	53	47
01:20:00	50.0	56.3	<110.2	53	46
01:25:00	57.0	74.7	<110.2	55	45
01:30:00	51.0	61.2	<110.2	53	46
01:35:00	50.5	63.5	<110.2	53	44
01:40:00	48.9	58.1	<110.2	51	45
01:45:00	49.9	58.9	<110.2	53	45
01:50:00	50.8	60.3	<110.2	54	45
01:55:00	48.6	57.1	<110.2	51	44

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(=0.0)	L(90.0)
	dBA	dBA	dBC	dBA ?	?wzA
ë					
02:00:00	48.9	57.6	<110.2	52	44
02:05:00	50.0	62.3	<110.2	51	45
02:10:00	50.6	57.5	<110.2	53	46
02:15:00	52.2	68.9	<110.2	53	47
02:20:00	52.0	61.5	<110.2	55	46
02:25:00	51.8	60.8	<110.2	55	45
02:30:00	56.5	73.4	<110.2	55	46
02:35:00	50.3	61.2	<110.2	52	45
02:40:00	49.8	57.5	<110.2	52	46
02:45:00	52.5	63.1	<110.2	54	47
02:50:00	50.9	58.8	<110.2	53	47
02:55:00	52.3	60.0	<110.2	55	47
03:00:00	51.6	61.9	<110.2	53	47
03:05:00	54.9	63.9	<110.2	57	50
03:10:00	51.3	61.2	<110.2	53	46
03:15:00	52.8	60.3	<110.2	55	48
03:20:00	52.5	61.5	<110.2	54	48
03:25:00	50.8	61.9	<110.2	52	46
03:30:00	51.2	58.3	<110.2	53	47
03:35:00	52.8	60.9	<110.2	56	47
03:40:00	53.4	61.5	<110.2	55	49
03:45:00	53.5	60.3	<110.2	55	48
03:50:00	53.3	61.8	<110.2	56	49
03:55:00	52.2	58.7	<110.2	55	48
04:00:00	54.4	63.1	<110.2	57	49
04:05:00	50.4	54.3	<110.2	52	48
04:10:00	54.3	64.1	<110.2	57	48
04:15:00	60.8	78.4	<110.2	63	47
04:20:00	52.7	61.7	<110.2	55	47
04:25:00	56.4	70.9	<110.2	58	49

04:30:00	52.8	62.3	<110.2	55	48
04:35:00	52.2	61.9	<110.2	54	48
04:40:00	54.2	63.6	<110.2	56	50
04:45:00	54.4	62.9	<110.2	58	49
04:50:00	55.9	64.1	<110.2	58	51
04:55:00	52.2	60.6	<110.2	54	47
05:00:00	52.9	62.9	<110.2	55	47
05:05:00	54.3	61.9	<110.2	58	47
05:10:00	54.2	63.2	<110.2	56	49
05:15:00	54.0	59.9	<110.2	56	50
05:20:00	55.2	63.7	<110.2	57	51
05:25:00	56.1	64.1	<110.2	59	52
05:30:00	57.2	62.3	<110.2	59	53
05:35:00	57.9	65.9	<110.2	60	53
05:40:00	56.6	64.4	<110.2	58	53
05:45:00	58.9	68.8	<110.2	61	55
05:50:00	57.5	63.6	<110.2	59	54
05:55:00	57.8	66.5	<110.2	59	54

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	tB{	tz}¿	?? tz}í
06:00:00	64.5	80.3	<110.2	68	55
06:05:00	57.6	63.4	<110.2	59	55
06:10:00	57.9	63.9	<110.2	59	55
06:15:00	57.8	64.1	<110.2	60	54
06:20:00	61.5	74.7	<110.2	63	56
06:25:00	58.7	63.8	<110.2	60	55
06:30:00	60.2	66.4	<110.2	62	57
06:35:00	60.4	68.6	<110.2	62	57
06:40:00	75.8	92.7	<110.2	72	59
06:45:00	62.3	71.7	<110.2	64	58
06:50:00	60.5	65.7	<110.2	62	57
06:55:00	59.7	65.0	<110.2	61	57
07:00:00	62.4	72.6	<110.2	65	58
07:05:00	63.1	73.9	<110.2	66	57
07:10:00	61.8	67.9	<110.2	63	59
07:15:00	62.5	69.2	<110.2	65	59
07:20:00	62.1	68.4	<110.2	64	59
07:25:00	69.1	79.9	<110.2	73	60
07:30:00	61.4	65.8	<110.2	62	60
07:35:00	61.9	70.4	<110.2	63	59
07:40:00	66.2	75.7	<110.2	70	60
07:45:00	73.2	83.6	<110.2	78	62
07:50:00	63.2	69.6	<110.2	64	62

07:55:00	63.1	67.5	<110.2	64	61
08:00:00	70.1	78.8	<110.2	75	62
08:05:00	70.2	79.1	<110.2	75	61
08:10:00	65.9	76.7	<110.2	66	61
08:15:00	62.9	78.0	<110.2	63	60
08:20:00	61.2	71.7	<110.2	61	59
08:25:00	61.2	70.8	<110.2	63	58
08:30:00	61.2	66.8	<110.2	62	59
08:35:00	62.2	69.2	<110.2	63	60
08:40:00	61.3	65.5	<110.2	62	60
08:45:00	68.0	74.9	<110.2	73	60
08:50:00	62.6	70.7	<110.2	64	59
08:55:00	66.7	74.8	<110.2	72	59
09:00:00	61.8	70.9	<110.2	63	58
09:05:00	66.5	77.1	<110.2	71	59
09:10:00	61.0	69.5	<110.2	62	58
09:15:00	60.8	65.3	<110.2	62	58
09:20:00	65.3	84.7	<110.2	65	58
09:25:00	62.3	78.3	<110.2	64	58
09:30:00	60.0	65.9	<110.2	62	56
09:35:00	61.3	68.0	<110.2	64	57
09:40:00	60.4	74.3	<110.2	61	57
09:45:00	58.6	64.6	<110.2	60	56
09:50:00	62.9	80.7	<110.2	64	56
09:55:00	62.3	67.3	<110.2	64	59

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	tBA	dBA	dBC ?¿¿	dB} ?	t{}íë
ê10:00:00	67.7	80.8	<110.2	69	59
10:05:00	65.8	74.5	<110.2	68	59
10:10:00	61.6	69.7	<110.2	64	58
10:15:00	63.3	70.0	<110.2	66	56
10:20:00	61.2	72.4	<110.2	64	54
10:25:00	65.0	71.2	<110.2	66	59
10:30:00	67.4	81.1	<110.2	68	64
10:35:00	60.2	68.3	<110.2	64	55
10:40:00	59.1	67.3	<110.2	62	54
10:45:00	59.1	70.7	<110.2	61	55
10:50:00	57.8	68.1	<110.2	59	53
10:55:00	59.4	68.5	<110.2	61	56
11:00:00	60.2	76.7	<110.2	61	55
11:05:00	60.5	69.5	<110.2	62	57
11:10:00	61.0	74.9	<110.2	62	57
11:15:00	59.8	69.2	<110.2	62	56

11:20:00	60.6	67.7	<110.2	63	56
11:25:00	57.5	61.9	<110.2	59	55
11:30:00	59.1	67.0	<110.2	61	55
11:35:00	60.3	65.3	<110.2	63	55
11:40:00	58.3	66.3	<110.2	60	55
11:45:00	60.1	75.5	<110.2	61	55
11:50:00	57.6	65.7	<110.2	59	54
11:55:00	58.9	68.7	<110.2	61	54
12:00:00	58.0	66.9	<110.2	60	54
12:05:00	58.7	65.1	<110.2	61	55
12:10:00	59.8	70.8	<110.2	61	55
12:15:00	57.9	66.7	<110.2	59	53
12:20:00	56.8	63.2	<110.2	58	54
12:25:00	56.9	65.1	<110.2	58	54
12:30:00	61.2	72.3	<110.2	63	56
12:35:00	60.1	68.3	<110.2	63	56
12:40:00	57.8	65.2	<110.2	59	54
12:45:00	58.2	63.9	<110.2	60	55
12:50:00	58.7	67.7	<110.2	61	55
12:55:00	59.1	70.1	<110.2	61	54
13:00:00	62.6	70.4	<110.2	67	58
13:05:00	60.6	66.8	<110.2	63	57
13:10:00	59.3	65.1	<110.2	61	56
13:15:00	59.9	68.4	<110.2	61	57
13:20:00	59.0	66.0	<110.2	60	56
13:25:00	60.7	72.0	<110.2	62	56
13:30:00	60.1	68.5	<110.2	62	56
13:35:00	62.8	81.6	<110.2	63	56
13:40:00	59.1	65.5	<110.2	61	57
13:45:00	60.4	69.1	<110.2	61	57
13:50:00	61.0	67.1	<110.2	63	57
13:55:00	59.1	64.8	<110.2	61	56

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dB}	dC{ ?	dzA	¿¿¿¿w{A
êíê14:00:00	61.5	74.8	<110.2	62	56
14:05:00	61.0	75.6	<110.2	63	55
14:10:00	59.3	70.5	<110.2	61	56
14:15:00	59.5	65.5	<110.2	61	56
14:20:00	65.5	86.8	116.6	60	55
14:25:00	59.5	70.7	<110.2	61	55
14:30:00	59.2	66.7	<110.2	61	55
14:35:00	65.3	84.5	<110.2	65	56
14:40:00	62.5	75.5	<110.2	63	55

14:45:00	60.4	71.1	<110.2	63	56
14:50:00	60.6	70.9	<110.2	64	55
14:55:00	58.1	63.2	<110.2	60	55
15:00:00	61.6	74.7	<110.2	62	55
15:05:00	59.6	71.3	<110.2	62	55
15:10:00	57.5	62.0	<110.2	59	55
15:15:00	61.8	74.3	<110.2	63	56
15:20:00	61.1	77.6	<110.2	62	56
15:25:00	59.1	66.1	<110.2	61	55
15:30:00	62.5	73.5	<110.2	66	56
15:35:00	60.1	72.3	<110.2	61	55
15:40:00	58.7	66.0	<110.2	59	56
15:45:00	59.5	66.9	<110.2	61	56
15:50:00	58.7	64.3	<110.2	60	56
15:55:00	59.0	72.4	<110.2	59	55
16:00:00	58.8	66.7	<110.2	60	55
16:05:00	58.8	64.4	<110.2	61	56
16:10:00	62.5	76.5	<110.2	64	56
16:15:00	61.6	76.3	<110.2	62	56
16:20:00	59.2	68.7	<110.2	60	56
16:25:00	60.6	74.0	<110.2	62	57
16:30:00	58.5	63.5	<110.2	60	56
16:35:00	59.4	73.9	<110.2	60	56
16:40:00	61.2	80.1	<110.2	62	56
16:45:00	58.7	67.5	<110.2	60	56
16:50:00	57.9	61.9	<110.2	59	56
16:55:00	62.3	80.9	<110.2	63	57
17:00:00	62.3	74.9	<110.2	65	56
17:05:00	59.6	70.9	<110.2	61	56
17:10:00	59.8	73.9	<110.2	59	56
17:15:00	59.2	67.9	<110.2	61	56
17:20:00	58.2	63.9	<110.2	59	55
17:25:00	61.6	74.7	<110.2	64	56
17:30:00	63.2	76.9	<110.2	66	56
17:35:00	65.6	75.3	<110.2	68	59
17:40:00	62.5	80.8	<110.2	64	56
17:45:00	66.3	76.5	<110.2	70	61
17:50:00	68.4	82.5	<110.2	71	58
17:55:00	58.9	64.2	<110.2	60	57

METROSONICS db-3080 SN 5899 V1.20 TEST: 2 OF 2

REPORT PRINTED 10/31/19 AT 14:13:53

USER ID: 000002

____

____

____

____

____

EXCHANGE RATE: 3dB FILTER: A WT.
DOSE CRITERION: 90dB RESPONSE: SLOW
DOSE LENGTH: 8 hours

PRE-CALIBRATION TIME: 09/20/19 AT 10:59:28
PRE-CALIBRATION RANGE: 42.2dBA TO 142.2dBA

____

POST-CALIBRATION TIME: 10/31/19 AT 14:01:26
POST-CALIBRATION RANGE: 42.2dBA TO 142.2dBA

____

TEST STARTED: 10/23/19 AT 12:00:00
TEST LENGTH: 01 DAYS 00:00:00
TEST ENDED: 10/24/19 AT 12:00:00
TIME HISTORY INTERVAL: 00:05:00

Lavg......... 67.6dBA
Lavg (80)... 66.8dBA
Lavg (90)... 65.9dBA
SEL.......... 116.8dBA

TWA.......... 72.3dBA
TWA (80)... 71.6dBA
TWA (90)... 70.6dBA

Lmax: 102.6dBA ON 10/24/19 AT 05:21:56
Lpk: 120.1dBC ON 10/24/19 AT 05:21:56
TIME OVER 66dBA 00 DAYS 00:49:08.24

DOSE (80)............. 1.41%
PROJ. DOSE (80)....... > 8 HRS.
DOSE (90)............. 1.14%
PROJ. DOSE (90)....... > 8 HRS.

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dzA	dB{	? tCA	??dzA
ëíê10/23/19					
12:00:00	63.0	81.8	<112.5	60	52
12:05:00	53.8	62.8	<112.5	55	51
12:10:00	59.3	70.4	<112.5	63	53
12:15:00	56.7	68.8	<112.5	58	51
12:20:00	53.8	60.9	<112.5	56	50
12:25:00	54.0	64.8	<112.5	55	51
12:30:00	54.2	60.4	<112.5	56	51
12:35:00	53.7	59.7	<112.5	55	52
12:40:00	61.1	74.8	<112.5	62	52
12:45:00	54.8	60.1	<112.5	57	51
12:50:00	55.4	64.0	<112.5	58	51
12:55:00	55.3	60.0	<112.5	57	52
13:00:00	53.8	61.4	<112.5	56	51
13:05:00	55.0	65.0	<112.5	57	52
13:10:00	54.4	58.8	<112.5	56	52
13:15:00	55.2	59.9	<112.5	56	53
13:20:00	54.3	64.4	<112.5	55	50
13:25:00	55.0	63.2	<112.5	57	52
13:30:00	53.3	56.3	<112.5	54	51
13:35:00	55.3	65.7	<112.5	56	52
13:40:00	54.3	60.8	<112.5	55	51
13:45:00	53.9	58.0	<112.5	55	51
13:50:00	54.4	59.6	<112.5	56	51
13:55:00	56.7	65.7	<112.5	60	52
14:00:00	53.5	57.3	<112.5	55	51
14:05:00	55.6	62.1	<112.5	57	53
14:10:00	54.3	57.7	<112.5	55	52
14:15:00	53.6	60.5	<112.5	55	50
14:20:00	54.2	60.9	<112.5	56	51
14:25:00	54.5	61.2	<112.5	56	52
14:30:00	53.8	57.2	<112.5	55	51
14:35:00	53.4	62.4	<112.5	54	51
14:40:00	54.8	68.1	<112.5	56	51
14:45:00	53.9	58.1	<112.5	55	52
14:50:00	53.8	56.5	<112.5	55	52
14:55:00	53.5	57.3	<112.5	55	51

15:00:00	55.6	63.2	<112.5	57	53
15:05:00	59.2	69.0	<112.5	62	53
15:10:00	53.4	57.6	<112.5	54	52
15:15:00	55.4	62.9	<112.5	57	53
15:20:00	55.1	59.2	<112.5	57	52
15:25:00	55.7	59.3	<112.5	57	54
15:30:00	55.8	58.5	<112.5	57	54
15:35:00	56.8	60.8	<112.5	58	54
15:40:00	56.7	60.5	<112.5	58	54
15:45:00	55.9	63.2	<112.5	57	53
15:50:00	55.6	59.2	<112.5	56	54
15:55:00	55.7	59.2	<112.5	57	54

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	tBA ? ?	dBC ?	dBA	tCAíêí 16:00:00 55.2 57.9 <112.5 56 52
16:05:00	54.8	57.6	<112.5	56	53
16:10:00	55.9	61.6	<112.5	57	53
16:15:00	55.9	59.2	<112.5	57	54
16:20:00	57.0	66.1	<112.5	58	54
16:25:00	57.7	72.1	<112.5	59	54
16:30:00	57.6	70.9	<112.5	59	54
16:35:00	56.8	64.4	<112.5	59	53
16:40:00	55.1	58.4	<112.5	56	52
16:45:00	58.4	67.4	<112.5	62	54
16:50:00	55.0	62.4	<112.5	56	52
16:55:00	64.8	85.6	<112.5	62	51
17:00:00	59.2	77.1	<112.5	58	52
17:05:00	55.7	71.7	<112.5	56	52
17:10:00	62.0	80.0	<112.5	63	53
17:15:00	54.9	61.4	<112.5	56	53
17:20:00	54.9	57.3	<112.5	56	53
17:25:00	54.2	57.2	<112.5	55	52
17:30:00	57.1	74.5	<112.5	56	52
17:35:00	56.3	68.5	<112.5	58	53
17:40:00	54.5	58.1	<112.5	55	52
17:45:00	55.5	67.2	<112.5	56	53
17:50:00	55.9	58.1	<112.5	56	54
17:55:00	55.8	61.2	<112.5	57	53
18:00:00	55.4	58.3	<112.5	56	53
18:05:00	63.6	74.0	<112.5	66	55
18:10:00	59.8	67.4	<112.5	61	57
18:15:00	56.8	60.0	<112.5	58	55
18:20:00	59.4	74.8	<112.5	60	57
18:25:00	58.1	61.6	<112.5	59	56

18:30:00	56.9	60.4	<112.5	58	54
18:35:00	57.0	64.0	<112.5	58	55
18:40:00	58.4	68.1	<112.5	60	56
18:45:00	65.4	84.4	<112.5	63	56
18:50:00	68.4	86.3	<112.5	71	58
18:55:00	67.7	81.0	<112.5	68	57
19:00:00	58.7	63.6	<112.5	60	56
19:05:00	57.3	66.6	<112.5	58	54
19:10:00	58.6	70.9	<112.5	60	55
19:15:00	59.3	62.8	<112.5	61	56
19:20:00	59.1	68.6	<112.5	61	56
19:25:00	57.1	60.4	<112.5	58	56
19:30:00	57.9	60.8	<112.5	59	56
19:35:00	65.4	78.0	<112.5	69	59
19:40:00	55.9	66.8	<112.5	58	53
19:45:00	54.0	56.4	<112.5	55	52
19:50:00	56.4	67.5	<112.5	55	52
19:55:00	69.0	82.9	<112.5	72	52

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dz}	? ¿wBC	? dBA?¿	¿¿?wB}í
20:00:00	60.1	74.0	<112.5	64	53
20:05:00	54.7	58.5	<112.5	56	51
20:10:00	54.9	64.4	<112.5	55	52
20:15:00	54.2	56.5	<112.5	55	52
20:20:00	54.2	57.4	<112.5	55	53
20:25:00	54.4	58.1	<112.5	56	52
20:30:00	52.5	55.3	<112.5	53	51
20:35:00	53.2	56.5	<112.5	54	51
20:40:00	52.5	58.0	<112.5	53	51
20:45:00	54.2	64.9	<112.5	54	52
20:50:00	53.4	57.0	<112.5	54	52
20:55:00	54.4	59.6	<112.5	56	52
21:00:00	55.2	62.4	<112.5	57	53
21:05:00	53.7	58.5	<112.5	54	52
21:10:00	54.7	62.0	<112.5	55	53
21:15:00	52.7	54.9	<112.5	53	51
21:20:00	53.1	59.3	<112.5	53	52
21:25:00	53.3	55.7	<112.5	54	52
21:30:00	53.4	57.5	<112.5	54	52
21:35:00	54.1	63.3	<112.5	55	51
21:40:00	55.3	64.9	<112.5	56	52
21:45:00	53.1	56.8	<112.5	53	52
21:50:00	65.5	75.7	<112.5	70	52

21:55:00	62.4	74.5	<112.5	64	59
22:00:00	67.5	77.6	<112.5	68	64
22:05:00	54.6	66.5	<112.5	53	50
22:10:00	60.6	67.3	<112.5	64	51
22:15:00	62.6	68.5	<112.5	66	51
22:20:00	56.0	66.0	<112.5	60	49
22:25:00	58.8	74.5	<112.5	61	50
22:30:00	65.1	81.8	<112.5	67	50
22:35:00	66.6	82.9	<112.5	69	52
22:40:00	54.9	67.6	<112.5	56	50
22:45:00	67.8	83.3	<112.5	71	56
22:50:00	53.0	62.0	<112.5	54	50
22:55:00	50.9	53.7	<112.5	51	50
23:00:00	53.2	65.9	<112.5	53	50
23:05:00	51.0	55.1	<112.5	52	50
23:10:00	51.5	54.4	<112.5	52	50
23:15:00	51.6	54.4	<112.5	52	50
23:20:00	51.6	54.8	<112.5	52	50
23:25:00	52.0	58.4	<112.5	53	50
23:30:00	51.1	55.8	<112.5	52	50
23:35:00	50.4	56.0	<112.5	51	49
23:40:00	50.7	54.5	<112.5	52	49
23:45:00	66.9	77.7	<112.5	71	51
23:50:00	59.9	73.7	<112.5	63	50
23:55:00	60.4	71.7	<112.5	64	50

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	? dBC?¿¿	dBA¿ ?	tz}íë
10/24/19					
00:00:00	66.9	76.9	<112.5	72	50
00:05:00	51.5	56.7	<112.5	52	50
00:10:00	63.8	72.9	<112.5	67	50
00:15:00	58.0	69.8	<112.5	60	50
00:20:00	50.6	53.3	<112.5	51	49
00:25:00	50.8	55.2	<112.5	51	49
00:30:00	50.4	54.4	<112.5	51	49
00:35:00	49.5	52.8	<112.5	50	48
00:40:00	49.3	52.7	<112.5	50	48
00:45:00	60.8	75.2	<112.5	64	49
00:50:00	58.6	67.6	<112.5	64	50
00:55:00	62.6	71.7	<112.5	65	52
01:00:00	63.1	75.7	<112.5	67	52
01:05:00	62.2	74.4	<112.5	67	53
01:10:00	59.9	69.9	<112.5	65	50

01:15:00	51.0	54.6	<112.5	51	50
01:20:00	51.7	65.2	<112.5	52	50
01:25:00	51.0	54.3	<112.5	51	49
01:30:00	50.1	52.5	<112.5	50	49
01:35:00	50.7	53.2	<112.5	51	49
01:40:00	54.5	60.0	<112.5	57	50
01:45:00	51.0	52.8	<112.5	51	50
01:50:00	50.7	55.7	<112.5	52	49
01:55:00	50.0	54.9	<112.5	50	49
02:00:00	58.7	78.4	<112.5	54	49
02:05:00	55.3	72.9	<112.5	57	48
02:10:00	63.8	83.8	<112.5	56	48
02:15:00	50.2	55.2	<112.5	51	48
02:20:00	53.1	59.3	<112.5	55	50
02:25:00	53.8	60.9	<112.5	56	51
02:30:00	52.9	62.3	<112.5	56	49
02:35:00	49.9	53.6	<112.5	51	48
02:40:00	49.8	54.3	<112.5	50	48
02:45:00	50.9	63.7	<112.5	52	48
02:50:00	49.7	54.8	<112.5	51	47
02:55:00	52.3	58.8	<112.5	54	49
03:00:00	54.5	62.8	<112.5	59	49
03:05:00	55.8	66.4	<112.5	62	48
03:10:00	50.3	54.0	<112.5	51	49
03:15:00	49.5	52.8	<112.5	50	48
03:20:00	53.3	66.4	<112.5	54	50
03:25:00	57.8	71.5	<112.5	61	52
03:30:00	57.5	65.6	<112.5	61	53
03:35:00	59.6	70.9	<112.5	63	50
03:40:00	53.7	63.7	<112.5	55	50
03:45:00	53.7	69.6	<112.5	53	50
03:50:00	51.5	55.4	<112.5	52	50
03:55:00	52.6	66.4	<112.5	52	50

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	gBA	¿ dBC	¿ gBA ¿	tB}
í					
04:00:00	55.8	71.0	<112.5	56	50
04:05:00	61.8	84.4	<112.5	54	51
04:10:00	51.8	55.0	<112.5	53	50
04:15:00	51.1	54.4	<112.5	52	50
04:20:00	52.3	58.0	<112.5	54	50
04:25:00	61.1	79.7	<112.5	57	50
04:30:00	51.9	56.5	<112.5	53	50

04:35:00	51.2	54.6	<112.5	52	50
04:40:00	51.4	54.9	<112.5	52	50
04:45:00	52.4	54.6	<112.5	53	51
04:50:00	53.0	55.2	<112.5	53	51
04:55:00	54.5	57.1	<112.5	55	53
05:00:00	55.8	60.1	<112.5	57	54
05:05:00	61.3	78.0	<112.5	60	54
05:10:00	55.7	66.0	<112.5	56	53
05:15:00	53.2	57.0	<112.5	54	51
05:20:00	82.5	102.6	120.1	79	55
05:25:00	80.1	101.9	117.7	78	53
05:30:00	54.3	61.7	<112.5	56	52
05:35:00	65.0	84.9	<112.5	60	53
05:40:00	61.4	76.8	<112.5	63	54
05:45:00	54.2	60.9	<112.5	55	52
05:50:00	55.0	64.5	<112.5	56	53
05:55:00	54.7	63.6	<112.5	55	53
06:00:00	64.9	87.6	<112.5	58	52
06:05:00	64.4	86.9	<112.5	55	52
06:10:00	54.5	58.9	<112.5	56	53
06:15:00	53.9	58.5	<112.5	55	52
06:20:00	54.4	59.7	<112.5	55	52
06:25:00	53.7	57.3	<112.5	55	52
06:30:00	55.3	61.2	<112.5	57	53
06:35:00	61.9	76.9	<112.5	65	55
06:40:00	62.3	75.1	<112.5	65	55
06:45:00	57.2	70.9	<112.5	59	54
06:50:00	67.7	89.3	<112.5	66	54
06:55:00	60.7	81.7	<112.5	58	54
07:00:00	62.2	77.3	<112.5	64	55
07:05:00	56.9	61.2	<112.5	58	54
07:10:00	57.0	60.6	<112.5	58	55
07:15:00	57.6	68.4	<112.5	58	55
07:20:00	56.9	70.0	<112.5	57	55
07:25:00	60.1	75.3	<112.5	62	56
07:30:00	57.1	64.0	<112.5	57	55
07:35:00	61.2	71.7	<112.5	65	56
07:40:00	68.7	82.9	<112.5	67	57
07:45:00	59.1	62.2	<112.5	60	57
07:50:00	56.7	61.4	<112.5	57	55
07:55:00	61.5	81.2	<112.5	60	56

<<< TIME HISTORY REPORT FOR TEST NUMBER 2 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0-
	dBA	dBA ?	dBC ? ?	dB} ?¿	?¿dC}í

08:00:00	57.0	64.0	<112.5	58	55
08:05:00	58.3	67.9	<112.5	60	56
08:10:00	59.3	66.1	<112.5	61	56
08:15:00	63.4	82.5	<112.5	58	55
08:20:00	55.6	61.2	<112.5	56	54
08:25:00	58.7	67.7	<112.5	61	55
08:30:00	69.6	91.9	<112.5	59	54
08:35:00	69.8	89.6	<112.5	68	54
08:40:00	59.3	74.2	<112.5	61	54
08:45:00	64.5	87.2	<112.5	58	54
08:50:00	62.7	82.0	<112.5	59	53
08:55:00	57.0	66.4	<112.5	58	54
09:00:00	56.8	61.9	<112.5	58	54
09:05:00	62.8	71.6	<112.5	66	55
09:10:00	56.1	58.9	<112.5	57	54
09:15:00	56.1	64.9	<112.5	58	54
09:20:00	73.0	83.0	<112.5	78	57
09:25:00	61.4	77.2	<112.5	63	56
09:30:00	57.9	71.7	<112.5	58	55
09:35:00	56.9	60.0	<112.5	58	55
09:40:00	58.5	70.9	<112.5	60	55
09:45:00	58.8	76.9	<112.5	60	54
09:50:00	57.8	64.4	<112.5	61	54
09:55:00	58.6	69.3	<112.5	61	55
10:00:00	57.7	64.6	<112.5	59	55
10:05:00	57.5	61.6	<112.5	59	54
10:10:00	57.5	62.1	<112.5	59	55
10:15:00	56.4	61.9	<112.5	58	54
10:20:00	56.4	64.9	<112.5	58	54
10:25:00	58.3	63.2	<112.5	60	55
10:30:00	57.9	61.5	<112.5	59	55
10:35:00	66.4	84.8	<112.5	60	55
10:40:00	61.6	79.4	<112.5	60	54
10:45:00	63.3	81.3	<112.5	61	55
10:50:00	58.4	62.4	<112.5	60	54
10:55:00	59.6	62.5	<112.5	61	58
11:00:00	58.7	63.1	<112.5	60	55
11:05:00	56.5	62.5	<112.5	58	54
11:10:00	63.3	82.9	<112.5	58	55
11:15:00	64.0	83.1	<112.5	61	54
11:20:00	57.5	66.5	<112.5	59	54
11:25:00	58.9	63.5	<112.5	60	56
11:30:00	67.8	77.2	<112.5	72	58
11:35:00	90.0	102.1	117.3	92	74
11:40:00	78.2	95.6	<112.5	74	55
11:45:00	58.1	65.3	<112.5	60	54
11:50:00	56.9	61.7	<112.5	58	54
11:55:00	58.3	62.0	<112.5	60	56

METROSONICS db-3080   SN 5899 V1.20   TEST: 1 OF   2

REPORT PRINTED 10/31/19 AT 14:14:24

USER ID: 000002

EXCHANGE RATE: 3dB   FILTER: A WT.
DOSE CRITERION: 90dB   RESPONSE: SLOW
DOSE LENGTH: 8 hours

PRE-CALIBRATION TIME: 09/20/19 AT 10:59:28
PRE-CALIBRATION RANGE: 42.2dBA TO 142.2dBA

POST-CALIBRATION TIME: 10/15/19 AT 18:47:13
POST-CALIBRATION RANGE: 42.2dBA TO 142.2dBA

TEST STARTED: 10/14/19 AT 18:00:00
TEST LENGTH: 01 DAYS   00:00:00
TEST ENDED: 10/15/19 AT 18:00:00
TIME HISTORY INTERVAL: 00:05:00

Lavg......... 59.9dBA
Lavg (80)... 56.1dBA
Lavg (90)... 46.7dBA
SEL.......... 109.1dBA

TWA.......... 64.6dBA
TWA (80)... 60.8dBA
TWA (90)... 51.5dBA

Lmax: 94.1dBA   ON   10/14/19 AT 21:40:24
Lpk: 115.3dBC   ON   10/14/19 AT 21:40:24
TIME OVER 66dBA 00 DAYS 00:32:08.08

DOSE (80).............   0.11%
PROJ. DOSE (80)....... > 8 HRS.
DOSE (90).............   0.01%

PROJ. DOSE (90)....... > 8 HRS.

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav dBA	Lmax dBA	Lpk dBC	L(10.0) dBA	L(90.0) ? ??dz}
10/14/19					
18:00:00	55.5	59.6	<112.5	57	53
18:05:00	54.7	58.4	<112.5	55	53
18:10:00	56.9	68.0	<112.5	58	53
18:15:00	55.1	60.4	<112.5	56	53
18:20:00	54.3	60.9	<112.5	55	52
18:25:00	54.6	58.5	<112.5	56	52
18:30:00	55.0	60.4	<112.5	56	53
18:35:00	55.0	59.8	<112.5	57	52
18:40:00	65.8	86.0	<112.5	66	55
18:45:00	56.0	64.0	<112.5	57	53
18:50:00	56.1	62.4	<112.5	58	53
18:55:00	66.0	86.4	<112.5	68	52
19:00:00	52.4	58.6	<112.5	53	51
19:05:00	52.8	55.7	<112.5	54	51
19:10:00	70.3	92.5	114.5	60	52
19:15:00	55.8	61.7	<112.5	57	53
19:20:00	55.1	61.1	<112.5	57	52
19:25:00	55.1	60.5	<112.5	56	52
19:30:00	52.7	55.3	<112.5	54	51
19:35:00	58.0	67.9	<112.5	62	50
19:40:00	63.3	77.3	<112.5	67	53
19:45:00	54.0	61.6	<112.5	56	51
19:50:00	52.4	56.0	<112.5	53	51
19:55:00	54.6	63.9	<112.5	56	51
20:00:00	52.2	54.4	<112.5	53	50
20:05:00	56.8	70.4	<112.5	59	52
20:10:00	54.5	65.7	<112.5	56	51
20:15:00	52.7	56.8	<112.5	54	51
20:20:00	52.4	56.4	<112.5	53	50
20:25:00	54.3	61.7	<112.5	57	51
20:30:00	53.5	64.0	<112.5	54	51
20:35:00	54.9	67.7	<112.5	56	51
20:40:00	57.1	68.6	<112.5	60	51
20:45:00	58.9	76.5	<112.5	58	50
20:50:00	56.7	74.8	<112.5	58	50
20:55:00	50.5	54.9	<112.5	51	49
21:00:00	51.8	59.2	<112.5	53	49
21:05:00	59.5	81.3	<112.5	52	49

21:10:00	58.2	79.6	<112.5	53	50
21:15:00	50.3	52.4	<112.5	51	49
21:20:00	50.2	53.2	<112.5	51	48
21:25:00	50.8	54.5	<112.5	52	49
21:30:00	64.8	84.9	<112.5	52	48
21:35:00	65.1	83.0	<112.5	65	49
21:40:00	72.0	94.1	115.3	72	51
21:45:00	67.9	74.9	<112.5	70	62
21:50:00	50.2	54.8	<112.5	51	48
21:55:00	51.0	54.8	<112.5	52	49

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	? dBC	?dCA	¿?tC}í
ê22:00:00	63.9	80.3	<112.5	69	50
22:05:00	50.0	54.4	<112.5	50	48
22:10:00	49.6	51.7	<112.5	50	48
22:15:00	49.8	52.5	<112.5	51	48
22:20:00	50.8	54.3	<112.5	52	49
22:25:00	51.2	53.3	<112.5	52	50
22:30:00	50.8	54.1	<112.5	51	49
22:35:00	50.7	53.4	<112.5	52	49
22:40:00	51.3	55.8	<112.5	52	50
22:45:00	54.2	73.7	<112.5	52	50
22:50:00	57.2	72.5	<112.5	60	49
22:55:00	54.8	71.2	<112.5	55	49
23:00:00	56.8	73.7	<112.5	60	48
23:05:00	52.8	68.9	<112.5	53	49
23:10:00	57.8	76.9	<112.5	53	49
23:15:00	54.0	67.9	<112.5	53	50
23:20:00	54.7	73.3	<112.5	54	50
23:25:00	57.6	71.2	<112.5	62	51
23:30:00	51.0	54.5	<112.5	52	49
23:35:00	53.6	67.8	<112.5	52	48
23:40:00	49.9	53.2	<112.5	51	48
23:45:00	49.5	54.4	<112.5	50	48
23:50:00	62.1	81.7	<112.5	54	47
23:55:00	48.6	53.6	<112.5	49	47
10/15/19					
00:00:00	48.6	53.3	<112.5	50	46
00:05:00	50.3	53.6	<112.5	51	48
00:10:00	48.7	55.4	<112.5	50	47
00:15:00	55.9	66.5	<112.5	59	48
00:20:00	48.8	53.6	<112.5	49	47

00:25:00	48.5	52.4	<112.5	50	47
00:30:00	48.3	51.7	<112.5	49	47
00:35:00	48.2	52.5	<112.5	49	47
00:40:00	50.2	56.7	<112.5	52	47
00:45:00	48.5	52.9	<112.5	50	46
00:50:00	48.9	52.7	<112.5	50	47
00:55:00	48.6	52.8	<112.5	49	47
01:00:00	48.4	50.5	<112.5	49	47
01:05:00	49.2	52.7	<112.5	50	48
01:10:00	48.7	50.9	<112.5	49	47
01:15:00	48.5	52.4	<112.5	49	47
01:20:00	62.0	80.9	<112.5	56	47
01:25:00	48.6	52.4	<112.5	50	47
01:30:00	49.5	57.4	<112.5	50	47
01:35:00	48.3	52.4	<112.5	49	46
01:40:00	48.0	52.4	<112.5	49	46
01:45:00	48.5	53.0	<112.5	50	47
01:50:00	48.4	53.1	<112.5	49	47
01:55:00	48.3	51.0	<112.5	49	47

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	? dC{	dCA	¿ tBAíê
ê02:00:00	48.7	55.6	<112.5	50	47
02:05:00	49.4	52.9	<112.5	50	48
02:10:00	48.7	51.2	<112.5	49	47
02:15:00	53.3	63.2	<112.5	56	47
02:20:00	49.3	54.0	<112.5	51	47
02:25:00	61.8	80.4	<112.5	56	47
02:30:00	48.4	52.1	<112.5	49	47
02:35:00	49.3	53.2	<112.5	50	47
02:40:00	50.5	60.6	<112.5	52	48
02:45:00	50.2	57.1	<112.5	51	48
02:50:00	50.4	57.4	<112.5	52	47
02:55:00	50.3	55.3	<112.5	52	48
03:00:00	50.8	56.0	<112.5	52	48
03:05:00	51.6	56.6	<112.5	54	48
03:10:00	50.1	53.6	<112.5	51	48
03:15:00	51.2	54.4	<112.5	53	49
03:20:00	50.4	55.2	<112.5	52	48
03:25:00	49.7	54.4	<112.5	51	47
03:30:00	50.7	58.0	<112.5	52	48
03:35:00	50.8	58.8	<112.5	52	48
03:40:00	51.7	58.3	<112.5	54	48
03:45:00	53.0	58.5	<112.5	55	49

03:50:00	51.3	56.9	<112.5	53	49
03:55:00	50.8	53.7	<112.5	52	49
04:00:00	50.4	55.2	<112.5	52	48
04:05:00	51.8	65.2	<112.5	51	48
04:10:00	60.7	81.9	<112.5	60	49
04:15:00	62.9	84.4	<112.5	53	49
04:20:00	60.1	81.2	<112.5	54	49
04:25:00	54.3	69.3	<112.5	52	49
04:30:00	51.4	57.1	<112.5	52	49
04:35:00	51.2	54.1	<112.5	52	50
04:40:00	51.6	53.6	<112.5	52	50
04:45:00	51.9	54.8	<112.5	52	50
04:50:00	52.8	59.9	<112.5	54	50
04:55:00	51.2	64.1	<112.5	51	48
05:00:00	50.1	52.4	<112.5	51	49
05:05:00	51.3	59.2	<112.5	52	49
05:10:00	51.1	56.4	<112.5	52	50
05:15:00	51.2	53.7	<112.5	52	50
05:20:00	52.4	59.2	<112.5	54	50
05:25:00	52.5	56.4	<112.5	53	51
05:30:00	53.0	55.6	<112.5	54	51
05:35:00	53.1	57.1	<112.5	54	51
05:40:00	52.5	58.8	<112.5	54	51
05:45:00	52.8	55.3	<112.5	53	51
05:50:00	52.9	62.5	<112.5	53	51
05:55:00	53.9	60.3	<112.5	56	52

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	tBC? ??	wCA	?? tz}íë
06:00:00	64.9	76.2	<112.5	70	53
06:05:00	53.2	56.5	<112.5	54	52
06:10:00	53.9	56.6	<112.5	54	52
06:15:00	53.8	56.1	<112.5	54	52
06:20:00	55.4	63.3	<112.5	57	53
06:25:00	53.5	56.0	<112.5	54	52
06:30:00	54.2	57.5	<112.5	55	53
06:35:00	65.0	76.6	<112.5	70	53
06:40:00	68.5	82.9	<112.5	73	54
06:45:00	55.4	59.6	<112.5	56	54
06:50:00	55.3	56.8	<112.5	56	54
06:55:00	55.4	58.5	<112.5	56	53
07:00:00	56.8	66.4	<112.5	58	54
07:05:00	65.2	86.9	<112.5	62	54
07:10:00	55.9	59.6	<112.5	56	55

07:15:00	56.4	62.4	<112.5	57	55
07:20:00	59.9	71.1	<112.5	63	55
07:25:00	57.4	66.6	<112.5	59	55
07:30:00	55.3	63.2	<112.5	56	54
07:35:00	55.3	58.8	<112.5	57	54
07:40:00	77.9	89.8	<112.5	83	56
07:45:00	58.1	62.1	<112.5	59	57
07:50:00	58.6	61.4	<112.5	59	57
07:55:00	59.8	62.7	<112.5	61	58
08:00:00	58.8	61.6	<112.5	60	57
08:05:00	58.3	64.0	<112.5	59	56
08:10:00	58.1	63.6	<112.5	59	56
08:15:00	57.7	61.1	<112.5	58	56
08:20:00	57.1	59.6	<112.5	58	55
08:25:00	55.5	62.0	<112.5	56	54
08:30:00	55.7	58.0	<112.5	56	54
08:35:00	57.0	59.8	<112.5	58	56
08:40:00	57.5	66.9	<112.5	58	56
08:45:00	57.9	64.0	<112.5	61	54
08:50:00	57.1	61.1	<112.5	58	55
08:55:00	56.9	64.0	<112.5	58	54
09:00:00	56.9	66.0	<112.5	59	54
09:05:00	56.2	62.3	<112.5	58	54
09:10:00	61.2	76.8	<112.5	62	55
09:15:00	56.5	73.6	<112.5	56	53
09:20:00	69.4	91.3	<112.5	67	54
09:25:00	57.6	68.1	<112.5	60	53
09:30:00	55.8	60.2	<112.5	57	53
09:35:00	60.4	70.5	<112.5	65	53
09:40:00	55.4	58.8	<112.5	56	53
09:45:00	59.5	72.1	<112.5	63	53
09:50:00	62.1	77.6	<112.5	66	55
09:55:00	56.3	64.8	<112.5	59	52

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME	Lav	Lmax	Lpk	L(10.0)	L(90.0)
	dBA	dBA	wBC?	gBA	? tB}
í 10:00:00	57.5	72.3	<112.5	58	53
10:05:00	55.7	66.8	<112.5	56	51
10:10:00	59.1	71.5	<112.5	60	53
10:15:00	52.7	56.0	<112.5	54	50
10:20:00	52.8	56.5	<112.5	54	51
10:25:00	53.4	60.3	<112.5	55	51
10:30:00	53.0	56.4	<112.5	54	51
10:35:00	52.9	62.0	<112.5	54	50

10:40:00	54.4	65.5	<112.5	55	51
10:45:00	52.9	57.2	<112.5	54	51
10:50:00	52.0	55.0	<112.5	53	50
10:55:00	54.1	61.2	<112.5	56	51
11:00:00	52.8	61.2	<112.5	54	50
11:05:00	53.6	58.8	<112.5	54	52
11:10:00	54.2	58.9	<112.5	55	52
11:15:00	53.6	57.9	<112.5	54	52
11:20:00	54.1	65.5	<112.5	55	52
11:25:00	53.4	57.7	<112.5	54	52
11:30:00	53.5	59.2	<112.5	55	51
11:35:00	52.7	56.7	<112.5	55	50
11:40:00	51.4	55.6	<112.5	52	50
11:45:00	52.8	61.7	<112.5	54	51
11:50:00	52.9	61.5	<112.5	54	51
11:55:00	53.5	61.5	<112.5	54	52
12:00:00	52.7	56.6	<112.5	54	51
12:05:00	52.1	55.6	<112.5	53	51
12:10:00	52.5	56.1	<112.5	54	50
12:15:00	52.6	55.4	<112.5	53	51
12:20:00	51.3	54.8	<112.5	52	50
12:25:00	53.6	63.1	<112.5	54	50
12:30:00	53.7	68.8	<112.5	54	50
12:35:00	51.8	54.0	<112.5	53	50
12:40:00	53.0	57.8	<112.5	54	51
12:45:00	53.3	57.7	<112.5	54	52
12:50:00	53.8	58.4	<112.5	55	52
12:55:00	53.9	58.4	<112.5	55	52
13:00:00	54.9	60.5	<112.5	56	52
13:05:00	54.3	59.5	<112.5	56	52
13:10:00	54.1	62.6	<112.5	54	52
13:15:00	54.0	58.8	<112.5	55	52
13:20:00	53.4	56.5	<112.5	54	52
13:25:00	53.2	56.2	<112.5	54	51
13:30:00	54.2	60.1	<112.5	55	52
13:35:00	53.4	57.6	<112.5	55	51
13:40:00	52.5	55.2	<112.5	53	51
13:45:00	53.4	58.9	<112.5	54	52
13:50:00	53.9	58.4	<112.5	55	52
13:55:00	54.4	65.8	<112.5	55	51

<<< TIME HISTORY REPORT FOR TEST NUMBER 1 OF 2 >>>

TIME Lav Lmax Lpk L(10.0) L(90.0)
dBA dBA ? dBC ? ?dC} ¿¿ ?dBA
í 14:00:00 51.8 54.9 <112.5 52 50

14:05:00	54.6	62.8	<112.5	56	51
14:10:00	54.0	57.4	<112.5	55	52
14:15:00	54.2	59.2	<112.5	55	53
14:20:00	55.3	58.0	<112.5	56	54
14:25:00	55.4	61.9	<112.5	56	53
14:30:00	54.9	61.7	<112.5	56	53
14:35:00	57.1	67.7	<112.5	60	52
14:40:00	53.6	56.4	<112.5	54	52
14:45:00	54.1	57.8	<112.5	55	52
14:50:00	53.8	57.6	<112.5	54	52
14:55:00	54.3	61.6	<112.5	55	53
15:00:00	54.8	58.0	<112.5	56	53
15:05:00	54.7	62.4	<112.5	55	53
15:10:00	54.4	57.7	<112.5	55	53
15:15:00	54.9	58.5	<112.5	56	53
15:20:00	54.3	60.0	<112.5	55	53
15:25:00	54.6	61.2	<112.5	55	53
15:30:00	54.4	57.2	<112.5	55	53
15:35:00	54.2	56.0	<112.5	54	53
15:40:00	55.1	59.3	<112.5	56	54
15:45:00	54.6	58.4	<112.5	55	53
15:50:00	54.3	56.9	<112.5	55	53
15:55:00	55.1	64.9	<112.5	56	53
16:00:00	54.6	58.8	<112.5	55	53
16:05:00	54.2	58.0	<112.5	55	53
16:10:00	59.4	80.1	<112.5	56	53
16:15:00	54.4	59.2	<112.5	55	53
16:20:00	61.2	82.4	<112.5	61	53
16:25:00	61.8	84.0	<112.5	60	52
16:30:00	54.1	58.0	<112.5	55	52
16:35:00	60.5	78.5	<112.5	61	53
16:40:00	54.5	65.3	<112.5	55	52
16:45:00	54.0	58.9	<112.5	54	53
16:50:00	54.5	63.3	<112.5	55	53
16:55:00	67.6	82.3	<112.5	67	55
17:00:00	67.0	81.8	<112.5	71	53
17:05:00	53.8	63.2	<112.5	55	52
17:10:00	53.8	55.8	<112.5	54	52
17:15:00	54.2	61.9	<112.5	55	52
17:20:00	54.2	66.1	<112.5	54	52
17:25:00	63.7	76.1	<112.5	68	53
17:30:00	67.1	78.5	<112.5	71	57
17:35:00	64.4	76.9	<112.5	68	52
17:40:00	68.5	88.8	<112.5	67	52
17:45:00	68.3	76.8	<112.5	73	58
17:50:00	73.0	89.4	<112.5	73	53
17:55:00	57.3	68.5	<112.5	60	52

CSV
[Setting]

[Property]
System Version,1.5
NX-42EX Version,1.5
NX-42WR Version,1.4
NX-42RT Version,1.5
NX-42FT Version,1.1
Serial Number,145380

[NL-42]
Store Name,0304
Type,NL-42
Index Number,1
Frequency Weighting,A
Time Weighting,S
Output Level Range Upper,120
Output Level Range Lower,40
Delay Time,Off
Windscreen Correction,WS-10
Diffuse Sound Field Correction,Off
LN Mode,Leq_1s
Display Leq,On
Display LE,Off
Display Lmax,On
Display Lmin,On
Display Ly,On
Display LN1,Off
Display LN2,Off
Display LN3,Off
Display LN4,On
Display LN5,Off
Display Time Level,On
Percentile 1,5
Percentile 2,10
Percentile 3,50
Percentile 4,90
Percentile 5,99.9
Ly Type,LCpeak
AC OUT,Z
DC OUT,Main
Comparator,Off
Comparator Level,66
Comparator Channel,Main
Battery Type,Alkaline
Communication Interface,USB
Baud Rate,9600
Language,English

[NX-42EX]
Lp Store Interval,Off
Leq Calculation Interval,5 m

Timer Auto Start Time,2019/10/23 12:00:00
Timer Auto Stop Time,2019/10/24 12:00:00
Timer Auto Interval,Off
Sleep Mode,Off

[Status]
Measurement Start Time,2019/10/23 12:00:00
Measurement Stop Time,2019/10/24 04:30:20
Lp Data Number,-
Leq Data Number,199
Measure Time,00d 16:30:20.0

Address	Start Time	Measurement Time	Leq	LE	Lmax	Lmin	Ly	LN1	LN2	LN3	LN4	LN5	Over	Under								
1	10/23/2019 12:00	00d 00:05:00.0	63.9	88.7	81.7	58.2	98.1	65.3	64.6	61.7	59.8	57.6	----	-----	test 1 (10/23/19)-(10/24-19)							
2	10/23/2019 12:05	00d 00:05:00.0	60.5	85.3	68	54.9	89.1	63.7	62.7	59.9	57.1	54.8	----	-----		row	row					
3	10/23/2019 12:10	00d 00:05:00.0	60.8	85.6	71.4	55.6	91	64	62.9	60.1	57.1	55.4	----	-----	Time Finish	Start	Stop	LAEQ				
4	10/23/2019 12:15	00d 00:05:00.0	65	89.8	72.5	55.1	93.9	67.9	66.4	64.6	63.3	54.4	----	-----	"""12:00-18:00"""	2	74	62.99723914	1993994.307	$D$2:$D$74	$D$2	$D$74
5	10/23/2019 12:20	00d 00:05:00.0	64.7	89.5	68.3	63.1	90.1	66.1	65.7	64.6	63.7	63	----	-----	"""18:00-24:00"""	74	146	62.45440565	1759707.823	$D$74:$D$146	$D$74	$D$146
6	10/23/2019 12:25	00d 00:05:00.0	64.8	89.6	70.5	62.5	93.1	66.8	66.2	64.3	63.6	62.3	----	-----	00:00-04:35	146	200	58.1619773	654934.2908	$D$146:$D$200	$D$146	$D$200
7	10/23/2019 12:30	00d 00:05:00.0	66.5	91.3	81.5	62.6	99.8	67.6	66.5	64.9	63.9	62.5	----	-----		4	4	60.8	1202264.435	$D$4:$D$4	$D$4	$D$4
8	10/23/2019 12:35	00d 00:05:00.0	65.4	90.2	71.3	63.2	96.8	67.8	67.2	64.9	64.2	63.1	----	-----	14.5 hr avg	2	291	60.24787317	1058735.113	$D$2:$D$291	$D$2	$D$291
9	10/23/2019 12:40	00d 00:05:00.0	65	89.8	68.7	63.5	93	66.3	66.1	64.9	63.9	63.5	----	-----		4	4	60.8	1202264.435	$D$4:$D$4	$D$4	$D$4
10	10/23/2019 12:45	00d 00:05:00.0	63.7	88.5	73.4	58	94	69.3	66.4	61.5	59.6	57.8	----	-----		4	4	60.8	1202264.435	$D$4:$D$4	$D$4	$D$4
11	10/23/2019 12:50	00d 00:05:00.0	61.1	85.9	67.1	56.7	92.1	64.3	63.5	60.5	58	56.1	----	-----								
12	10/23/2019 12:55	00d 00:05:00.0	61.6	86.4	74.3	57	103.6	63.9	63.3	60.5	58.3	56.6	----	-----								
13	10/23/2019 13:00	00d 00:05:00.0	62.8	87.6	68.1	57.4	92	65.7	65.2	62.3	59.6	57.4	----	-----								
14	10/23/2019 13:05	00d 00:05:00.0	61.8	86.6	66.5	57.5	88.4	64.7	63.7	61.4	58.8	57.2	----	-----								
15	10/23/2019 13:10	00d 00:05:00.0	62.7	87.5	67.1	58.3	90.8	65.8	64.8	62.3	59.5	58	----	-----								
16	10/23/2019 13:15	00d 00:05:00.0	62.3	87.1	69.3	56.6	92.2	65.2	64.7	61.7	58.8	56.7	----	-----								
17	10/23/2019 13:20	00d 00:05:00.0	61.7	86.5	71.4	57.1	94.2	64.7	63.8	60.8	58.5	57	----	-----								
18	10/23/2019 13:25	00d 00:05:00.0	62.6	87.4	76.9	58.3	94.1	64.2	63.7	61.6	59.8	58.1	----	-----								
19	10/23/2019 13:30	00d 00:05:00.0	62.6	87.4	66.4	57	93.1	64.9	64.3	62.4	60.4	56.8	----	-----								
20	10/23/2019 13:35	00d 00:05:00.0	61.6	86.4	65	58.4	93.2	63.4	63	61.5	59.7	58.4	----	-----								
21	10/23/2019 13:40	00d 00:05:00.0	63.4	88.2	74.1	56.8	96.9	66.5	64.6	62.2	58.8	56.8	----	-----								
22	10/23/2019 13:45	00d 00:05:00.0	62.5	87.3	76.8	57.8	95.8	64.6	63.8	61.4	58.7	57.7	----	-----								
23	10/23/2019 13:50	00d 00:05:00.0	61.9	86.7	67	57.1	89.4	65	64.1	61.3	58.5	56.8	----	-----								
24	10/23/2019 13:55	00d 00:05:00.0	61.8	86.6	67.6	56.7	93.1	65	64	61.3	58.9	56.5	----	-----								
25	10/23/2019 14:00	00d 00:05:00.0	62.6	87.4	74.4	57.6	99	65.7	64.9	60.8	58.9	57.3	----	-----								
26	10/23/2019 14:05	00d 00:05:00.0	63.4	88.2	78.2	58.4	96.7	65.9	65.1	62.1	60	58.5	----	-----								
27	10/23/2019 14:10	00d 00:05:00.0	62.5	87.3	67.6	59	92	65.8	64.9	61.9	60	58.6	----	-----								
28	10/23/2019 14:15	00d 00:05:00.0	62.7	87.5	69.7	59	91.4	64.8	64.3	62.5	60.6	58.8	----	-----								
29	10/23/2019 14:20	00d 00:05:00.0	60.9	85.7	64.4	55.5	88	63.5	63	60.7	57.5	55.5	----	-----								
30	10/23/2019 14:25	00d 00:05:00.0	62.4	87.2	72.2	57.2	92.8	65.4	64.6	61.6	59.5	56.8	----	-----								
31	10/23/2019 14:30	00d 00:05:00.0	62.2	87	67.4	58	95	64.9	64	61.7	59.6	57.9	----	-----								
32	10/23/2019 14:35	00d 00:05:00.0	60.6	85.4	65.3	57.1	91.9	63.2	62.3	60.4	58.1	56.9	----	-----								
33	10/23/2019 14:40	00d 00:05:00.0	61.8	86.6	68.5	57.9	96.8	64.1	63.6	61.2	59.2	57.4	----	-----								
34	10/23/2019 14:45	00d 00:05:00.0	63	87.8	80.4	58.2	96.1	63.8	63.3	61.1	59.5	57.9	----	-----								
35	10/23/2019 14:50	00d 00:05:00.0	61.2	86	70.8	57.2	94.9	63.3	62.8	60.8	59.1	57.1	----	-----								
36	10/23/2019 14:55	00d 00:05:00.0	61.9	86.7	66.5	57.2	93.6	65.7	64.2	61.4	58.8	56.9	----	-----								
37	10/23/2019 15:00	00d 00:05:00.0	60.7	85.5	65.8	57.5	88	63.3	62.5	60.4	58.5	57.5	----	-----								
38	10/23/2019 15:05	00d 00:05:00.0	63.7	88.5	81.3	58.7	98.9	64.6	64	61.8	59.6	58.4	----	-----								
39	10/23/2019 15:10	00d 00:05:00.0	63.2	88	70.8	59.4	97.4	66.6	64.6	62.4	61	59.4	----	-----								
40	10/23/2019 15:15	00d 00:05:00.0	62.3	87.1	67.3	58.5	92.6	65.1	64	61.9	60.3	58.4	----	-----								
41	10/23/2019 15:20	00d 00:05:00.0	63.8	88.6	70.5	58	91.3	66.7	65.8	63.3	59.8	58.1	----	-----								
42	10/23/2019 15:25	00d 00:05:00.0	63.3	88.1	67.3	60.1	91.6	65.8	65.2	62.9	61.1	60	----	-----								
43	10/23/2019 15:30	00d 00:05:00.0	63.1	87.9	71.9	60.2	87.8	65	64.5	62.8	61.3	60.1	----	-----								
44	10/23/2019 15:35	00d 00:05:00.0	63.3	88.1	65.8	60.2	89.6	65.2	64.9	63	61.6	60.1	----	-----								
45	10/23/2019 15:40	00d 00:05:00.0	62.8	87.6	65.8	59.7	88.6	64.6	64.1	62.7	61.2	59.6	----	-----								
46	10/23/2019 15:45	00d 00:05:00.0	64.1	88.9	67.7	61.9	91.7	65.9	65.3	63.9	62.7	61.6	----	-----								
47	10/23/2019 15:50	00d 00:05:00.0	63.3	88.1	67.8	60.2	90.8	65	64.7	63.1	61.5	60.4	----	-----								
48	10/23/2019 15:55	00d 00:05:00.0	62.9	87.7	71.1	59.6	87.5	64.7	64.3	62.4	61.2	59.5	----	-----								
49	10/23/2019 16:00	00d 00:05:00.0	61.8	86.6	67.7	58.1	89.9	63.6	63	61.9	59.8	58.2	----	-----								
50	10/23/2019 16:05	00d 00:05:00.0	62.4	87.2	65.8	57.3	87.2	65	64.4	62.4	59.9	57.1	----	-----								

51	10/23/2019 16:10	00d 00:05:00.0	63.8	88.6	69.2	59.4	94.7	66.1	65.4	63.6	61.2	59.4	----	-----
52	10/23/2019 16:15	00d 00:05:00.0	62.9	87.7	72.4	60.1	99.6	65	64.4	62.3	60.8	60	----	-----
53	10/23/2019 16:20	00d 00:05:00.0	64.2	89	73	60	95.2	67.2	65.8	63.4	61	60	----	-----
54	10/23/2019 16:25	00d 00:05:00.0	63	87.8	68.2	59.5	88.9	64.6	64.3	62.9	61.3	59.5	----	-----
55	10/23/2019 16:30	00d 00:05:00.0	64.2	89	73.5	60.4	90.8	66.7	65.8	63.5	62.3	60.3	----	-----
56	10/23/2019 16:35	00d 00:05:00.0	63.9	88.7	69.7	60.6	90.3	65.7	65.4	63.8	61.9	60.4	----	-----
57	10/23/2019 16:40	00d 00:05:00.0	62.4	87.2	71.7	58.8	88.8	64.3	63.9	62.2	60.2	58.5	----	-----
58	10/23/2019 16:45	00d 00:05:00.0	62.4	87.2	66.3	59.1	95.6	64.3	63.9	62.3	60.4	59	----	-----
59	10/23/2019 16:50	00d 00:05:00.0	62.4	87.2	70	58.5	91.8	65.2	64.3	61.7	60	58.2	----	-----
60	10/23/2019 16:55	00d 00:05:00.0	62.9	87.7	67.4	58.5	94.3	65.9	65.3	62.2	60.8	58.4	----	-----
61	10/23/2019 17:00	00d 00:05:00.0	64.9	89.7	76.9	58.4	100.7	69.7	68.5	62.8	60.8	58.2	----	-----
62	10/23/2019 17:05	00d 00:05:00.0	63.1	87.9	68.4	59.5	94.1	66	65	62.7	60.4	59.4	----	-----
63	10/23/2019 17:10	00d 00:05:00.0	61.7	86.5	66.7	57.8	89.6	63.6	63.1	61.6	59.3	57.7	----	-----
64	10/23/2019 17:15	00d 00:05:00.0	62.1	86.9	64.5	59.7	88.6	64.1	63.5	61.8	60.7	59.6	----	-----
65	10/23/2019 17:20	00d 00:05:00.0	63.4	88.2	71.9	59.6	92.7	66.3	65.1	62.7	61.1	59.5	----	-----
66	10/23/2019 17:25	00d 00:05:00.0	63.1	87.9	73.3	60.4	90.2	64.5	63.7	62.6	61.3	60.2	----	-----
67	10/23/2019 17:30	00d 00:05:00.0	62.9	87.7	65.8	59.1	86.3	65.1	64.7	62.8	60.9	58.9	----	-----
68	10/23/2019 17:35	00d 00:05:00.0	63.4	88.2	72.5	58.6	92.5	66.4	64.8	62.8	60.2	58.7	----	-----
69	10/23/2019 17:40	00d 00:05:00.0	61.8	86.6	64.7	58.6	86.6	63.2	63	61.8	60.1	58.5	----	-----
70	10/23/2019 17:45	00d 00:05:00.0	63.9	88.7	78.5	58.3	93.4	64.5	63.9	62.2	60	58.1	----	-----
71	10/23/2019 17:50	00d 00:05:00.0	62.6	87.4	65	60.1	85.6	64.1	63.8	62.4	61.3	60	----	-----
72	10/23/2019 17:55	00d 00:05:00.0	63	87.8	66.3	60.7	89.3	64.6	64.2	62.8	61.8	60.5	----	-----
73	10/23/2019 18:00	00d 00:05:00.0	62.2	87	67.3	57.9	88.9	64.3	63.7	62.1	59.7	57.8	----	-----
74	10/23/2019 18:05	00d 00:05:00.0	66.3	91.1	83.7	60.2	96.3	66.1	64.3	62.4	61.1	60	----	-----
75	10/23/2019 18:10	00d 00:05:00.0	63.1	87.9	69	59.9	86.6	65	64.3	62.9	61.7	59.9	----	-----
76	10/23/2019 18:15	00d 00:05:00.0	62.1	86.9	65.3	60	83.8	63.6	63.2	62	60.8	59.8	----	-----
77	10/23/2019 18:20	00d 00:05:00.0	63.2	88	66.9	59.2	87.4	65.4	64.8	63	61.3	59.1	----	-----
78	10/23/2019 18:25	00d 00:05:00.0	63.6	88.4	66.2	60.7	85.4	65.3	64.8	63.6	62.1	60.7	----	-----
79	10/23/2019 18:30	00d 00:05:00.0	61.3	86.1	71.9	58.1	88.2	63.1	62.7	60.9	59.2	58.1	----	-----
80	10/23/2019 18:35	00d 00:05:00.0	61.9	86.7	64.6	59.1	83.9	63.6	63.2	61.7	60.7	58.9	----	-----
81	10/23/2019 18:40	00d 00:05:00.0	61.9	86.7	65.2	59.4	88.5	64	63.4	61.6	60.5	59.4	----	-----
82	10/23/2019 18:45	00d 00:05:00.0	62.9	87.7	65.8	59.1	85.4	65	64.7	62.9	60.1	59	----	-----
83	10/23/2019 18:50	00d 00:05:00.0	62.7	87.5	71.6	59.4	87.5	64.8	64.2	62.4	60.7	58.8	----	-----
84	10/23/2019 18:55	00d 00:05:00.0	62.4	87.2	66.3	59.7	87.1	64.2	63.9	62.2	61	59.8	----	-----
85	10/23/2019 19:00	00d 00:05:00.0	62.1	86.9	66.6	59.9	85.8	64.5	63.3	61.8	60.6	59.8	----	-----
86	10/23/2019 19:05	00d 00:05:00.0	59.5	84.3	63.9	55.8	84.6	62.1	61.4	59.1	57.2	55.6	----	-----
87	10/23/2019 19:10	00d 00:05:00.0	58.2	83	61.7	55	82.9	60	59.7	58.2	56	54.8	----	-----
88	10/23/2019 19:15	00d 00:05:00.0	58.3	83.1	71.6	55.1	87.4	60.7	59.5	57.5	56.1	55	----	-----
89	10/23/2019 19:20	00d 00:05:00.0	59	83.8	64.4	55.6	89.9	61	60.3	58.7	57.2	55.5	----	-----
90	10/23/2019 19:25	00d 00:05:00.0	59.4	84.2	63.1	57.3	86.4	61	60.5	59.2	58	57.2	----	-----
91	10/23/2019 19:30	00d 00:05:00.0	58.2	83	61.2	55.2	82	59.8	59.4	58.2	56.7	55.1	----	-----
92	10/23/2019 19:35	00d 00:05:00.0	59.6	84.4	72	55.8	87.8	61.6	61	59	57.5	55.8	----	-----
93	10/23/2019 19:40	00d 00:05:00.0	59.9	84.7	65.1	56.6	87.4	62.2	61.8	59.4	57.7	56.6	----	-----
94	10/23/2019 19:45	00d 00:05:00.0	61.3	86.1	74.4	57.6	98.7	63.6	62.9	60.4	58.7	57.3	----	-----
95	10/23/2019 19:50	00d 00:05:00.0	59.6	84.4	63	56.5	84.8	61.8	61.3	59.4	57.6	56.5	----	-----
96	10/23/2019 19:55	00d 00:05:00.0	58	82.8	62.6	53.6	83.6	60.1	59.7	57.9	55.7	53.3	----	-----
97	10/23/2019 20:00	00d 00:05:00.0	58.6	83.4	71.5	54.6	88.3	60.7	60.1	58	56.1	54.5	----	-----
98	10/23/2019 20:05	00d 00:05:00.0	63.7	88.5	76	56.8	94.3	68.2	66.5	61.8	58.1	56.7	----	-----
99	10/23/2019 20:10	00d 00:05:00.0	72.3	97.1	88.3	56.3	107.2	79.9	70.9	60	57.6	56.3	----	-----
100	10/23/2019 20:15	00d 00:05:00.0	68.6	93.4	81.2	56.5	104.4	75.9	72.4	59.8	57.4	56.3	----	-----
101	10/23/2019 20:20	00d 00:05:00.0	67.5	92.3	82	56.4	104.6	74.1	66.6	59.5	57.5	56.3	----	-----
102	10/23/2019 20:25	00d 00:05:00.0	59.1	83.9	65.3	55.3	91.7	61.1	60.6	58.7	56.9	55.3	----	-----
103	10/23/2019 20:30	00d 00:05:00.0	59.1	83.9	63.5	56	89.9	61	60.5	58.9	57.5	55.9	----	-----
104	10/23/2019 20:35	00d 00:05:00.0	58.4	83.2	61.5	55.4	84.2	60.2	59.8	58.2	56.7	55.3	----	-----
105	10/23/2019 20:40	00d 00:05:00.0	57.3	82.1	60.7	54.9	81.3	59.3	58.8	57	55.6	54.8	----	-----
106	10/23/2019 20:45	00d 00:05:00.0	57.8	82.6	71.7	54.8	87.3	59.2	58.7	57.1	56.2	54.7	----	-----
107	10/23/2019 20:50	00d 00:05:00.0	58.3	83.1	65.6	54.7	89.2	61.7	59.9	57.6	56.1	54.7	----	-----
108	10/23/2019 20:55	00d 00:05:00.0	58.2	83	62.8	55	88.9	61.2	60.3	57.6	55.9	54.9	----	-----

109	10/23/2019 21:00	00d 00:05:00.0	62.4	87.2	72.6	56.7	95.2	68.2	65.9	59.3	57.4	56.4	----	-----
110	10/23/2019 21:05	00d 00:05:00.0	59.2	84	71.9	55.4	86.7	61.4	60.4	58.6	57.2	55.3	----	-----
111	10/23/2019 21:10	00d 00:05:00.0	57.7	82.5	61.2	55.1	84.7	59.9	59.2	57.6	55.9	55	----	-----
112	10/23/2019 21:15	00d 00:05:00.0	58.4	83.2	67.7	54.8	87.1	62.5	59.8	57	55.5	54.7	----	-----
113	10/23/2019 21:20	00d 00:05:00.0	59.5	84.3	71	52.7	95.2	63.1	62.6	56.6	53.8	52.5	----	-----
114	10/23/2019 21:25	00d 00:05:00.0	56.6	81.4	70.2	53.8	84.5	57.4	56.7	55.1	54.3	53.5	----	-----
115	10/23/2019 21:30	00d 00:05:00.0	57.1	81.9	71.3	53.6	87.9	58.1	57.7	56.5	55.3	53.6	----	-----
116	10/23/2019 21:35	00d 00:05:00.0	61.5	86.3	75	55.5	90.7	64.8	59.9	58	56.6	55.5	----	-----
117	10/23/2019 21:40	00d 00:05:00.0	56.8	81.6	67.5	54.2	85.6	58.4	57.9	56.4	55.1	54.1	----	-----
118	10/23/2019 21:45	00d 00:05:00.0	63.5	88.3	75.5	55.1	89.1	72.4	62.8	57.4	56	54.7	----	-----
119	10/23/2019 21:50	00d 00:05:00.0	62.4	87.2	71.8	55.8	96	66.5	65.9	59.9	56.7	55.6	----	-----
120	10/23/2019 21:55	00d 00:05:00.0	66.2	91	74.9	54.6	94.4	72.6	70.9	57.8	55.6	54.5	----	-----
121	10/23/2019 22:00	00d 00:05:00.0	62.2	87	77.8	55.2	93.3	65.6	64.7	57.6	56.1	55.1	----	-----
122	10/23/2019 22:05	00d 00:05:00.0	67.7	92.5	76.3	55.6	94.4	74.1	71.9	63.9	56.8	55.5	----	-----
123	10/23/2019 22:10	00d 00:05:00.0	56	80.8	59.3	53.6	84.1	58	57.4	55.7	54.3	53.6	----	-----
124	10/23/2019 22:15	00d 00:05:00.0	59.3	84.1	72.1	52.1	88	63.7	62.7	57	53.8	52.1	----	-----
125	10/23/2019 22:20	00d 00:05:00.0	63.1	87.9	70.7	52.4	91.1	67.3	66.3	62.6	54	52.3	----	-----
126	10/23/2019 22:25	00d 00:05:00.0	58	82.8	71	52.5	90.3	62.3	60.7	54.9	53.6	52.5	----	-----
127	10/23/2019 22:30	00d 00:05:00.0	59.8	84.6	73.3	52.2	97.5	64.1	62.2	56.4	53.4	52.1	----	-----
128	10/23/2019 22:35	00d 00:05:00.0	63.1	87.9	72.1	52.6	90	67.5	66.6	60.6	53.7	52.6	----	-----
129	10/23/2019 22:40	00d 00:05:00.0	58.3	83.1	72.8	51.4	94.6	62.3	61.6	53.8	52.2	51.3	----	-----
130	10/23/2019 22:45	00d 00:05:00.0	58.9	83.7	73	51.6	100	63.5	61.8	55.9	52.6	51.5	----	-----
131	10/23/2019 22:50	00d 00:05:00.0	60.9	85.7	67.2	52.5	91.6	64.5	63.4	61	54.1	52.4	----	-----
132	10/23/2019 22:55	00d 00:05:00.0	66	90.8	71.6	58.6	99.2	69.5	68.8	65.3	60	58.6	----	-----
133	10/23/2019 23:00	00d 00:05:00.0	61.5	86.3	73.1	53.4	96	64.3	62.8	61.2	54.6	53.3	----	-----
134	10/23/2019 23:05	00d 00:05:00.0	55.9	80.7	65.6	52.5	89.4	59.4	57	54.8	53.5	52.5	----	-----
135	10/23/2019 23:10	00d 00:05:00.0	54.8	79.6	62.7	51.9	87.2	58.6	55.9	54	52.7	51.8	----	-----
136	10/23/2019 23:15	00d 00:05:00.0	58	82.8	71.2	51.7	96.6	63.5	61.2	54.3	52.7	51.6	----	-----
137	10/23/2019 23:20	00d 00:05:00.0	55.8	80.6	65.7	51.1	91.7	60.9	59.6	53.7	52.2	51	----	-----
138	10/23/2019 23:25	00d 00:05:00.0	55.9	80.7	71.3	51.3	87.4	59.2	56.8	54	52.4	51.2	----	-----
139	10/23/2019 23:30	00d 00:05:00.0	53.1	77.9	56.9	51	83.9	55.4	54.7	52.7	51.5	51	----	-----
140	10/23/2019 23:35	00d 00:05:00.0	53.2	78	58.1	50.8	88.2	56.3	55	52.5	51.4	50.7	----	-----
141	10/23/2019 23:40	00d 00:05:00.0	53	77.8	57.2	50.7	84.2	55	54.5	52.7	51.2	50.6	----	-----
142	10/23/2019 23:45	00d 00:05:00.0	67	91.8	79.2	51.7	97.3	73.7	70.3	55.9	52.7	51.5	----	-----
143	10/23/2019 23:50	00d 00:05:00.0	69	93.8	79.6	54.5	103.1	75.1	73.8	62.9	56.5	54.3	----	-----
144	10/23/2019 23:55	00d 00:05:00.0	57.2	82	64.6	53.9	92.2	60.8	58.9	56.1	54.5	54	----	-----
145	10/24/2019 0:00	00d 00:05:00.0	61.3	86.1	71	51.4	91.8	67	65.7	56	52.9	51.4	----	-----
146	10/24/2019 0:05	00d 00:05:00.0	63	87.8	74.6	51.8	93.9	68.1	66.2	60.8	52.9	51.8	----	-----
147	10/24/2019 0:10	00d 00:05:00.0	57.8	82.6	71.3	52	99.6	62.4	60.3	53.3	52.4	51.9	----	-----
148	10/24/2019 0:15	00d 00:05:00.0	64.7	89.5	87.1	53.2	112.1	66.3	64.9	56.5	53.7	53	----	-----
149	10/24/2019 0:20	00d 00:05:00.0	67.7	92.5	72.4	59.7	99.6	71.7	71.1	67.4	62.1	59.5	----	-----
150	10/24/2019 0:25	00d 00:05:00.0	62.5	87.3	72.4	55.5	97.9	65.5	64.2	62.3	59.5	55.3	----	-----
151	10/24/2019 0:30	00d 00:05:00.0	57.1	81.9	71.5	53.9	91.4	59.4	57.7	56.1	54.6	53.7	----	-----
152	10/24/2019 0:35	00d 00:05:00.0	56.6	81.4	63.3	54.2	88.5	60.4	57.8	55.7	54.8	53.8	----	-----
153	10/24/2019 0:40	00d 00:05:00.0	55.4	80.2	63.8	50.3	87.3	58.1	56.9	54.6	52.5	50.2	----	-----
154	10/24/2019 0:45	00d 00:05:00.0	58.6	83.4	64.7	52.5	95.6	60.7	59.9	58.9	54.3	52.5	----	-----
155	10/24/2019 0:50	00d 00:05:00.0	53.8	78.6	57.7	51.4	90.9	55.8	55	53.5	52.6	51.2	----	-----
156	10/24/2019 0:55	00d 00:05:00.0	56.3	81.1	71.5	51.3	92	59.1	58.4	54.6	52.3	51.3	----	-----
157	10/24/2019 1:00	00d 00:05:00.0	53.8	78.6	59.1	51	84.4	55.4	54.8	53.6	51.8	50.9	----	-----
158	10/24/2019 1:05	00d 00:05:00.0	53.4	78.2	57.5	51.5	82.8	55.1	54.7	53.2	52.4	51.4	----	-----
159	10/24/2019 1:10	00d 00:05:00.0	53.8	78.6	61.6	51	84.3	57.2	55.4	52.9	51.8	50.9	----	-----
160	10/24/2019 1:15	00d 00:05:00.0	57.1	81.9	71.5	55	91.2	59	57.7	56.2	55.6	54.9	----	-----
161	10/24/2019 1:20	00d 00:05:00.0	56.1	80.9	59.6	55.1	90.2	57.2	56.8	55.9	55.5	55	----	-----
162	10/24/2019 1:25	00d 00:05:00.0	56.6	81.4	61.7	55.1	90.1	58.6	57.4	56.1	55.5	55	----	-----
163	10/24/2019 1:30	00d 00:05:00.0	57.7	82.5	69	53.5	88.5	62.4	60.1	55.3	54	53.5	----	-----
164	10/24/2019 1:35	00d 00:05:00.0	54.3	79.1	57.5	53	83	56	55.3	54.1	53.4	52.9	----	-----
165	10/24/2019 1:40	00d 00:05:00.0	58.5	83.3	71.5	53.5	89.4	59.9	58.6	55.8	55.1	53.4	----	-----
166	10/24/2019 1:45	00d 00:05:00.0	59.2	84	71.2	53.7	92.9	62.6	60.6	56.8	54.7	53.6	----	-----

167	10/24/2019 1:50	00d 00:05:00.0	55.5	80.3	59.2	54.2	82.9	58.2	56.7	55.1	54.5	54.1	----	-----
168	10/24/2019 1:55	00d 00:05:00.0	57.6	82.4	71.9	54.7	88.8	57.8	57	55.8	55.1	54.7	----	-----
169	10/24/2019 2:00	00d 00:05:00.0	57.3	82.1	71.2	53.6	88.5	59.6	57.5	55.8	54.2	53.5	----	-----
170	10/24/2019 2:05	00d 00:05:00.0	57.8	82.6	70.3	53.5	89.9	61.1	59.6	56.3	54.3	53.4	----	-----
171	10/24/2019 2:10	00d 00:05:00.0	57.8	82.6	70.5	53.5	93.6	61.3	59.6	55.4	54.3	53.3	----	-----
172	10/24/2019 2:15	00d 00:05:00.0	56.6	81.4	67.5	54.1	87.3	59.3	57.7	55.3	54.6	54	----	-----
173	10/24/2019 2:20	00d 00:05:00.0	55.1	79.9	57.2	53.9	86.9	56.4	56	55	54.3	53.8	----	-----
174	10/24/2019 2:25	00d 00:05:00.0	56.5	81.3	71.7	53.8	87.9	58.8	57.8	55.4	54.5	53.8	----	-----
175	10/24/2019 2:30	00d 00:05:00.0	56.1	80.9	61.4	53.8	83.8	59.3	58	55.4	54.3	53.8	----	-----
176	10/24/2019 2:35	00d 00:05:00.0	56.6	81.4	71.7	53.9	86.5	57.5	56.3	55.2	54.3	53.8	----	-----
177	10/24/2019 2:40	00d 00:05:00.0	56.8	81.6	67	53.7	89.4	59.6	57.2	55.5	54.5	53.8	----	-----
178	10/24/2019 2:45	00d 00:05:00.0	55.8	80.6	61.9	53.9	84.1	57.9	57.4	55.2	54.4	53.9	----	-----
179	10/24/2019 2:50	00d 00:05:00.0	56.3	81.1	71	53.8	88.4	58	57.5	55.3	54.4	53.8	----	-----
180	10/24/2019 2:55	00d 00:05:00.0	55.3	80.1	60.2	53.3	86.1	57.3	56.6	55.1	54.1	53.3	----	-----
181	10/24/2019 3:00	00d 00:05:00.0	62.3	87.1	84.6	53.2	105.6	58.3	57.3	55	53.6	53.2	----	-----
182	10/24/2019 3:05	00d 00:05:00.0	56.8	81.6	66.6	53.6	88.7	60.7	58.1	55.6	54.2	53.5	----	-----
183	10/24/2019 3:10	00d 00:05:00.0	56.1	80.9	71.3	53.6	87	57	56.5	55	54.3	53.6	----	-----
184	10/24/2019 3:15	00d 00:05:00.0	55.6	80.4	60	53.4	81.8	57.6	57	55.4	54.2	53.5	----	-----
185	10/24/2019 3:20	00d 00:05:00.0	55	79.8	62.1	53.7	84.5	56.2	55.9	54.8	54.1	53.6	----	-----
186	10/24/2019 3:25	00d 00:05:00.0	56	80.8	63.1	53.2	83.6	59.8	57.6	55	53.7	53	----	-----
187	10/24/2019 3:30	00d 00:05:00.0	54.4	79.2	58.8	51.6	86.2	56.9	56.3	53.8	52.6	51.6	----	-----
188	10/24/2019 3:35	00d 00:05:00.0	54.6	79.4	71.4	50.7	86	56.7	56	52.9	51.4	50.7	----	-----
189	10/24/2019 3:40	00d 00:05:00.0	57	81.8	77.2	50.1	94.1	56.4	55.6	53	51.4	50	----	-----
190	10/24/2019 3:45	00d 00:05:00.0	55.4	80.2	70.3	52.7	88.9	56.3	55.7	53.9	53.1	52.5	----	-----
191	10/24/2019 3:50	00d 00:05:00.0	55.1	79.9	60.1	52.8	85.7	57.5	56.9	54.6	53.6	53	----	-----
192	10/24/2019 3:55	00d 00:05:00.0	55.4	80.2	70.7	52.2	90.7	57.6	55.8	54.3	52.8	52	----	-----
193	10/24/2019 4:00	00d 00:05:00.0	55.9	80.7	67.8	51.8	86.3	59.5	57.2	53.6	52.6	51.7	----	-----
194	10/24/2019 4:05	00d 00:05:00.0	53.9	78.7	57.7	51.9	84.9	55.8	55.2	53.6	52.6	52	----	-----
195	10/24/2019 4:10	00d 00:05:00.0	54.5	79.3	58.8	52.4	86.7	57.1	56.2	53.9	53	52.4	----	-----
196	10/24/2019 4:15	00d 00:05:00.0	54.3	79.1	58.7	52.2	85.1	56.9	55.6	53.9	52.9	52.2	----	-----
197	10/24/2019 4:20	00d 00:05:00.0	55.6	80.4	71.4	52	87	57.9	56.7	54.2	52.7	52	----	-----
198	10/24/2019 4:25	00d 00:05:00.0	55.5	80.3	59.1	52.3	86.7	57.7	57.5	55.3	53.4	52.3	----	-----
199	10/24/2019 4:30	00d 00:00:20.0	53.8	66.8	55.6	52.3	82	56	55.5	53.8	52.4	52.3	----	-----

METROSONICS db-308 SN 3392 V3.0 4/88
REPORT PRINTED 10/31/19 @ 14:35:17

DOUBLING RATE: 3dB   FILTER: A WGHT
DOSE CRITERION: 90dB   RESPONSE: SLOW
PRE-CALIBRATION TIME: 10/14/19 @ 14:56:30
PRE-CALIBRATION RANGE: 40.4dB TO 140.4dB
POST-CALIBRATION TIME: 10/31/19 @ 14:04:44
POST-CALIBRATION RANGE: 40.4dB TO 140.4dB

CALIBRATOR TYPE & SERIAL # : ___________________________

CALIBRATOR CALIBRATION DATE: ___________________________

TEST BEGAN 10/23/19 @ 12:00:03
TEST LENGTH: 0DAYS 17:29:47
TEST ENDED 10/24/19 @ 5:29:50
TEST INTERRUPTIONS: 1

Lav = 67.0dB   Lav (80)= 62.0dB
SEL =114.8dB   Lav (90)= 57.1dB
Lmax =101.8dB ON 10/23/19 @ 16:30:56
Lpk =119.5dB ON 10/23/19 @ 16:30:56
TIME OVER 66dB 0D 2:11:26.43

8 HR DOSE (80dB CUTOFF)= 0.34%
8 HR DOSE (90dB CUTOFF)= 0.10%
"TIME HISTORY REPORT

"# OF PERIODS: 210   MODE: CONTINUOUS
"PERIOD LENGTH: 0:05:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 99.9%

"DATE: 10/23/19 TAG #:   0

"INT"	"TIME"	"Lav"	"Lmx"	"Lpk"	"L1"	"L2"
1	"12:00:03"	65.5	82.1	109.8	65	59
2	"12:05:03"	64.9	82.5	"UNR"	63	57
3	"12:10:03"	64.2	81.4	109.2	62	58
4	"12:15:03"	61.7	73.1	"UNR"	63	57
5	"12:20:03"	65.0	82.2	"UNR"	64	58
6	"12:25:03"	64.1	82.9	"UNR"	63	57
7	"12:30:03"	65.4	83.3	110.2	67	59
8	"12:35:03"	65.8	81.6	"UNR"	65	59
9	"12:40:03"	66.0	83.0	"UNR"	67	59
10	"12:45:03"	64.9	79.8	"UNR"	67	59
11	"12:50:03"	66.0	81.6	109.2	67	59
12	"12:55:03"	67.0	83.2	109.2	67	58
13	"13:00:03"	66.1	81.8	112.0	66	58
14	"13:05:03"	64.5	73.3	114.7	67	58
15	"13:10:03"	65.7	81.3	"UNR"	66	59
16	"13:15:03"	66.8	82.8	111.2	67	59

17	"13:20:03"	65.8	82.5	110.2	67	57
18	"13:25:03"	61.9	70.4	"UNR"	64	55
19	"13:30:03"	62.0	69.7	109.8	64	58
20	"13:35:03"	59.9	62.9	"UNR"	61	56
21	"13:40:03"	61.6	68.7	"UNR"	63	55
22	"13:45:03"	66.0	82.1	114.1	66	59
23	"13:50:03"	64.9	80.4	109.8	64	57
24	"13:55:03"	66.2	83.1	"UNR"	65	58
25	"14:00:03"	64.4	79.5	"UNR"	66	57
26	"14:05:03"	63.5	80.1	110.7	64	56
27	"14:10:03"	61.4	67.1	"UNR"	63	56
28	"14:15:03"	60.8	64.3	"UNR"	62	56
29	"14:20:03"	59.9	66.0	"UNR"	62	55
30	"14:25:03"	65.7	83.0	110.2	65	57
31	"14:30:03"	65.5	84.8	109.2	64	59
32	"14:35:03"	64.4	81.8	"UNR"	62	58
33	"14:40:03"	63.5	80.4	114.7	63	59
34	"14:45:03"	66.2	83.2	111.2	66	58
35	"14:50:03"	66.1	82.5	109.8	65	59
36	"14:55:03"	62.0	67.4	109.2	63	59
37	"15:00:03"	65.5	80.8	110.2	65	60
38	"15:05:03"	67.8	80.3	117.0	70	60
39	"15:10:03"	69.9	84.6	118.0	72	59
40	"15:15:03"	67.4	83.3	116.0	69	59
41	"15:20:03"	65.2	80.4	"UNR"	64	59
42	"15:25:03"	65.9	81.3	"UNR"	64	59
43	"15:30:03"	65.3	82.3	"UNR"	64	60
44	"15:35:03"	63.4	68.7	"UNR"	65	61
45	"15:40:03"	65.3	80.8	111.2	65	61
46	"15:45:03"	65.3	80.3	"UNR"	65	61
47	"15:50:03"	62.6	70.9	109.8	63	60
48	"15:55:03"	65.3	81.5	"UNR"	63	60
49	"16:00:03"	65.9	81.7	109.2	64	60
50	"16:05:03"	65.2	81.5	109.2	63	60
51	"16:10:03"	62.8	67.2	"UNR"	63	60
52	"16:15:03"	66.1	80.6	111.6	66	60
53	"16:20:03"	66.1	81.2	"UNR"	65	60
54	"16:25:03"	66.5	84.4	114.4	65	60
55	"16:30:03"	78.6	101.8	119.5	67	59
56	"16:35:03"	68.6	87.2	"UNR"	70	59
57	"16:40:03"	61.5	65.2	"UNR"	62	58
58	"16:45:03"	61.2	64.8	"UNR"	62	58
59	"16:50:03"	71.7	84.4	"UNR"	76	58
60	"16:55:03"	74.0	88.6	"UNR"	79	58
61	"17:00:03"	62.1	72.2	"UNR"	63	58
62	"17:05:03"	62.3	70.8	"UNR"	64	57
63	"17:10:03"	70.8	87.0	"UNR"	73	61
64	"17:15:03"	72.0	89.7	"UNR"	73	58
65	"17:20:03"	73.0	88.5	109.2	75	62
66	"17:25:03"	73.0	91.5	"UNR"	73	60
67	"17:30:03"	65.2	79.5	"UNR"	68	59
68	"17:35:03"	70.9	91.7	113.8	69	58
69	"17:40:03"	61.9	65.3	"UNR"	63	59
70	"17:45:03"	62.0	67.8	"UNR"	63	58

71	"17:50:03"	62.1	64.7	"UNR"	63	59
72	"17:55:03"	62.5	65.0	"UNR"	63	59
73	"18:00:03"	62.2	66.2	"UNR"	64	57
74	"18:05:03"	63.4	67.9	"UNR"	64	61
75	"18:10:03"	65.6	79.1	"UNR"	65	61
76	"18:15:03"	63.3	66.0	"UNR"	64	60
77	"18:20:03"	62.5	66.8	"UNR"	64	59
78	"18:25:03"	63.2	66.2	"UNR"	64	60
79	"18:30:03"	60.8	64.1	"UNR"	62	58
80	"18:35:03"	61.5	66.1	"UNR"	62	59
81	"18:40:03"	61.5	65.7	"UNR"	62	58
82	"18:45:03"	62.3	66.6	"UNR"	64	58
83	"18:50:03"	62.1	66.8	"UNR"	63	58
84	"18:55:03"	67.0	78.9	"UNR"	70	59
85	"19:00:03"	62.0	66.0	"UNR"	63	58
86	"19:05:03"	60.6	65.8	"UNR"	62	56
87	"19:10:03"	60.6	64.6	"UNR"	62	56
88	"19:15:03"	61.7	65.6	"UNR"	63	58
89	"19:20:03"	61.1	64.4	"UNR"	62	58
90	"19:25:03"	60.7	65.8	"UNR"	62	57
91	"19:30:03"	59.3	62.9	"UNR"	60	56
92	"19:35:03"	59.4	62.8	"UNR"	60	56
93	"19:40:03"	60.7	70.4	"UNR"	62	57
94	"19:45:03"	60.0	64.3	"UNR"	61	57
95	"19:50:03"	59.7	65.2	"UNR"	61	55
96	"19:55:03"	58.7	61.2	"UNR"	60	55
97	"20:00:03"	68.6	87.5	"UNR"	61	54
98	"20:05:03"	67.1	81.0	"UNR"	72	54
99	"20:10:03"	64.0	82.1	"UNR"	65	57
100	"20:15:03"	61.4	74.5	"UNR"	61	55
101	"20:20:03"	67.8	83.7	"UNR"	68	57
102	"20:25:03"	68.6	83.3	"UNR"	69	59
103	"20:30:03"	65.8	82.7	"UNR"	62	59
104	"20:35:03"	67.1	83.1	"UNR"	64	58
105	"20:40:03"	57.2	61.5	"UNR"	58	53
106	"20:45:03"	57.9	64.5	"UNR"	59	55
107	"20:50:03"	59.8	70.2	"UNR"	60	55
108	"20:55:03"	63.2	80.4	"UNR"	65	56
109	"21:00:03"	69.2	80.9	"UNR"	73	55
110	"21:05:03"	60.4	72.3	"UNR"	62	56
111	"21:10:03"	58.4	71.2	"UNR"	58	54
112	"21:15:03"	59.5	72.9	"UNR"	60	55
113	"21:20:03"	61.0	72.2	"UNR"	65	54
114	"21:25:03"	57.2	66.6	"UNR"	58	54
115	"21:30:03"	57.8	60.4	"UNR"	59	53
116	"21:35:03"	60.3	72.9	"UNR"	60	55
117	"21:40:03"	56.9	66.7	"UNR"	57	54
118	"21:45:03"	63.1	75.9	"UNR"	65	54
119	"21:50:03"	58.7	63.9	"UNR"	60	54
120	"21:55:03"	71.5	82.2	"UNR"	75	53
121	"22:00:03"	64.4	74.7	"UNR"	70	54
122	"22:05:03"	76.8	86.1	"UNR"	80	54
123	"22:10:03"	56.0	60.2	"UNR"	57	53
124	"22:15:03"	71.3	84.3	"UNR"	74	53

125	"22:20:03"	70.8	79.7	"UNR"	73	53
126	"22:25:03"	64.3	73.8	"UNR"	69	52
127	"22:30:03"	66.9	82.1	"UNR"	70	51
128	"22:35:03"	77.6	95.1	"UNR"	77	51
129	"22:40:03"	64.3	76.2	"UNR"	68	53
130	"22:45:03"	67.2	79.1	"UNR"	72	55
131	"22:50:03"	71.3	79.9	"UNR"	75	52
132	"22:55:03"	56.2	62.4	"UNR"	58	53
133	"23:00:03"	56.2	63.0	"UNR"	58	51
134	"23:05:03"	60.6	76.7	"UNR"	58	52
135	"23:10:03"	55.5	62.4	"UNR"	57	52
136	"23:15:03"	64.6	82.1	"UNR"	66	52
137	"23:20:03"	65.9	82.9	"UNR"	66	57
138	"23:25:03"	65.0	82.5	"UNR"	63	57
139	"23:30:03"	67.5	83.2	"UNR"	67	51
140	"23:35:03"	59.0	69.8	"UNR"	61	50
141	"23:40:03"	55.0	67.1	"UNR"	56	50
142	"23:45:03"	59.7	73.6	"UNR"	64	50
143	"23:50:03"	77.8	90.7	"UNR"	80	53
144	"23:55:03"	68.9	79.2	"UNR"	72	55
145	" 0:00:03"	68.3	79.3	"UNR"	72	55
146	" 0:05:03"	73.7	81.7	"UNR"	76	57
147	" 0:10:03"	67.6	82.2	"UNR"	70	61
148	" 0:15:03"	71.8	81.0	"UNR"	76	56
149	" 0:20:03"	71.4	83.2	108.7	77	57
150	" 0:25:03"	64.7	82.3	"UNR"	60	57
151	" 0:30:03"	65.4	81.4	"UNR"	68	58
152	" 0:35:03"	64.9	82.6	"UNR"	61	58
153	" 0:40:03"	66.3	82.8	"UNR"	63	57
154	" 0:45:03"	63.7	83.4	"UNR"	61	58
155	" 0:50:03"	70.0	82.6	"UNR"	73	57
156	" 0:55:03"	73.5	86.2	109.8	77	57
157	" 1:00:03"	55.1	61.0	"UNR"	57	50
158	" 1:05:03"	55.6	65.7	"UNR"	58	49
159	" 1:10:03"	58.4	67.1	"UNR"	61	50
160	" 1:15:03"	70.6	82.4	109.2	75	58
161	" 1:20:03"	68.7	82.7	"UNR"	70	63
162	" 1:25:03"	70.2	87.2	110.2	72	61
163	" 1:30:03"	67.4	85.8	"UNR"	66	48
164	" 1:35:03"	57.9	65.6	"UNR"	62	48
165	" 1:40:03"	57.3	65.2	"UNR"	58	54
166	" 1:45:03"	59.6	70.8	"UNR"	61	55
167	" 1:50:03"	54.4	61.7	"UNR"	57	48
168	" 1:55:03"	52.1	59.7	"UNR"	54	48
169	" 2:00:03"	52.6	56.4	"UNR"	54	49
170	" 2:05:03"	61.7	78.2	"UNR"	62	48
171	" 2:10:03"	69.1	87.7	"UNR"	67	51
172	" 2:15:03"	57.8	62.4	"UNR"	58	56
173	" 2:20:03"	64.0	81.8	"UNR"	58	56
174	" 2:25:03"	64.5	82.3	"UNR"	61	50
175	" 2:30:03"	54.7	61.0	"UNR"	57	49
176	" 2:35:03"	55.3	63.9	"UNR"	58	49
177	" 2:40:03"	53.6	58.7	"UNR"	55	49
178	" 2:45:03"	61.2	80.1	"UNR"	59	51

179 " 2:50:03" 62.3 82.0 "UNR"   60   57
180 " 2:55:03" 64.4 82.3 "UNR"   59   57
181 " 3:00:03" 64.9 82.1 "UNR"   60   56
182 " 3:05:03" 64.3 81.9 "UNR"   60   56
183 " 3:10:03" 58.4 61.2 "UNR"   59   57
184 " 3:15:03" 64.3 82.0 "UNR"   59   57
185 " 3:20:03" 65.2 81.8 "UNR"   60   57
186 " 3:25:03" 64.4 82.0 "UNR"   61   57
187 " 3:30:03" 65.2 82.1 "UNR"   61   57
188 " 3:35:03" 64.4 82.0 "UNR"   60   57
189 " 3:40:03" 59.0 62.2 "UNR"   60   57
190 " 3:45:03" 66.0 82.0 "UNR"   66   57
191 " 3:50:03" 67.8 82.1 "UNR"   67   62
192 " 3:55:03" 67.0 82.0 "UNR"   66   63
193 " 4:00:03" 66.8 82.0 "UNR"   66   63
194 " 4:05:03" 65.0 76.3 "UNR"   66   63
195 " 4:10:03" 68.4 81.8 "UNR"   68   65
196 " 4:15:03" 68.1 83.0 "UNR"   67   64
197 " 4:20:03" 68.3 82.2 "UNR"   67   64
198 " 4:25:03" 66.0 68.6 "UNR"   66   64
199 " 4:30:03" 67.3 82.7 "UNR"   66   64
200 " 4:35:03" 67.5 81.9 "UNR"   67   64
201 " 4:40:03" 66.4 82.4 "UNR"   65   59
202 " 4:45:03" 61.0 63.7 "UNR"   62   59
203 " 4:50:03" 65.3 82.2 "UNR"   62   59
204 " 4:55:03" 65.6 82.1 "UNR"   62   59
205 " 5:00:03" 65.3 82.0 "UNR"   62   59
206 " 5:05:03" 66.5 82.2 "UNR"   65   59
207 " 5:10:03" 61.4 76.6 "UNR"   62   58
208 " 5:15:03" 56.2 61.2 "UNR"   57   52
209 " 5:20:03" 59.4 70.5 "UNR"   62   52
210 " 5:25:03" 61.3 72.5 "UNR"   63   56

** AMPLITUDE DISTRIBUTION REPORT **

TOTAL SAMPLES =   1007807

dB	SAMPLES		% OF TOTAL
48	483	.	.05
49	2112	+	.21
50	5479	*	.54
51	10276	*	1.02
52	12946	*	1.28
53	17774	**	1.76
54	23012	**	2.28
55	27780	***	2.76
56	42044	****	4.17
57	69339	*******	6.88
58	82719	********	8.21
59	89415	*********	8.87
60	112814	***********	11.19
61	118083	************	11.72
62	105202	**********	10.44
63	65961	*******	6.55

64	58081	******	5.76
65	38104	****	3.78
66	24500	**	2.43
67	13798	*	1.37
68	10610	*	1.05
69	9584	*	.95
70	9713	*	.96
71	9209	*	.91
72	7334	*	.73
73	6898	*	.68
74	6426	*	.64
75	5658	*	.56
76	4766	+	.47
77	4257	+	.42
78	3678	+	.36
79	3444	+	.34
80	2556	+	.25
81	1471	+	.15
82	788	.	.08
83	445	.	.04
84	270	.	.03
85	229	.	.02
86	162	.	.02
87	129	.	.01
88	57	.	.01
89	37		.00
90	39		.00
91	34		.00
92	17		.00
93	23		.00
94	15		.00
95	7		.00
96	3		.00
97	5		.00
98	4		.00
99	6		.00

dB	SAMPLES	% OF TOTAL
100	5	.00
101	6	.00

Ln(0.0) = 101dB
Ln(10.0) = 67dB
Ln(50.0) = 61dB
Ln(99.9) = 49dB

	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
Ldod	64.5dB	53.6dB	43.6dB
Losha	63.5dB	45.9dB	41.8dB
Leq(6)	63.0dB	45.3dB	40.6dB

�

CSV
[Setting]

[Property]
System Version,2.0
NX-42EX Version,1.9
NX-42WR Version,1.7
NX-42RT Version,1.9
NX-42FT Version,1.3
Serial Number,133002

[NL-42]
Store Name,0508
Type,NL-42
Index Number,1
Frequency Weighting,A
Time Weighting,S
Output Level Range Upper,120
Output Level Range Lower,40
Delay Time,Off
Windscreen Correction,WS-10
Diffuse Sound Field Correction,Off
LN Mode,Lp
Display Leq,On
Display LE,Off
Display Lmax,On
Display Lmin,On
Display Ly,Off
Display LN1,Off
Display LN2,Off
Display LN3,Off
Display LN4,On
Display LN5,Off
Display Time Level,On
Percentile 1,5
Percentile 2,10
Percentile 3,50
Percentile 4,90
Percentile 5,95.0
Ly Type,Off
AC OUT,Z
DC OUT,Main
Comparator,Off
Comparator Level,70
Comparator Channel,Main
Battery Type,Alkaline
Communication Interface,USB
Baud Rate,9600
Language,English

[NX-42EX]
Lp Store Interval,Off
Leq Calculation Interval,5 m

Timer Auto Start Time,2019/10/23 12:00:00
Timer Auto Stop Time,2019/10/24 12:00:00
Timer Auto Interval,Off
Sleep Mode,Off

[Status]
Measurement Start Time,2019/10/23 12:00:00
Measurement Stop Time,2019/10/24 04:27:13
Lp Data Number,-
Leq Data Number,198
Measure Time,00d 16:27:13.8

Address	Start Time	Measurement Time	Leq	LE	Lmax	Lmin	Ly	LN1	LN2	LN3	LN4	LN5	Over	Under
1	10/23/2019 12:00	00d 00:05:00.0	62.4	87.2	74.3	57.3	-.-	65	64.1	61.6	58.8	58.1	----	-----
2	10/23/2019 12:05	00d 00:05:00.0	62	86.8	70.7	57.5	-.-	64	63.3	61.5	59.1	58.5	----	-----
3	10/23/2019 12:10	00d 00:05:00.0	69	93.8	82.9	57.3	-.-	74.9	72.2	63.9	59.1	58.5	----	-----
4	10/23/2019 12:15	00d 00:05:00.0	68	92.8	79.6	63.3	-.-	72.5	70.3	66.2	64.4	64	----	-----
5	10/23/2019 12:20	00d 00:05:00.0	66.5	91.3	70.8	64	-.-	67.8	67.3	66.4	65.4	64.9	----	-----
6	10/23/2019 12:25	00d 00:05:00.0	72.3	97.1	91.9	65.1	-.-	76	73.2	66.8	66.1	65.9	----	-----
7	10/23/2019 12:30	00d 00:05:00.0	67.9	92.7	77.7	65	-.-	69.9	68.7	66.5	65.7	65.6	----	-----
8	10/23/2019 12:35	00d 00:05:00.0	66.2	91	69.4	64.5	-.-	67.3	67	66.2	65.4	65.2	----	-----
9	10/23/2019 12:40	00d 00:05:00.0	66.7	91.5	74.6	64.8	-.-	67.7	67.3	66.5	65.6	65.4	----	-----
10	10/23/2019 12:45	00d 00:05:00.0	65.2	90	75.1	57.1	-.-	70.7	68.9	62.7	58.4	58.1	----	-----
11	10/23/2019 12:50	00d 00:05:00.0	61.6	86.4	72.9	56.7	-.-	65.1	64	60.5	57.8	57.3	----	-----
12	10/23/2019 12:55	00d 00:05:00.0	61.5	86.3	74	57.1	-.-	64.4	62.1	59.5	58.3	58	----	-----
13	10/23/2019 13:00	00d 00:05:00.0	67.3	92.1	81.1	56.4	-.-	73.9	66.5	59.2	58.1	57.9	----	-----
14	10/23/2019 13:05	00d 00:05:00.0	69.7	94.5	85	59.6	-.-	75.5	71.8	63.4	61.2	60.9	----	-----
15	10/23/2019 13:10	00d 00:05:00.0	62.5	87.3	67.8	60.1	-.-	64.9	63.9	62	61.1	60.8	----	-----
16	10/23/2019 13:15	00d 00:05:00.0	65.9	90.7	72.6	62.2	-.-	70	67	65.1	64.1	63.8	----	-----
17	10/23/2019 13:20	00d 00:05:00.0	67.4	92.2	79.5	59.6	-.-	73.7	70.1	64.1	60.5	60.2	----	-----
18	10/23/2019 13:25	00d 00:05:00.0	67.3	92.1	77.9	63.1	-.-	70.2	68.5	66	64.5	64.3	----	-----
19	10/23/2019 13:30	00d 00:05:00.0	64.5	89.3	71	61.8	-.-	66	65.5	64.1	63	62.7	----	-----
20	10/23/2019 13:35	00d 00:05:00.0	73.3	98.1	93.2	64.2	-.-	75.9	75.2	66	65	64.7	----	-----
21	10/23/2019 13:40	00d 00:05:00.0	67.4	92.2	79.6	58.5	-.-	73.4	70	64.4	61.9	60.4	----	-----
22	10/23/2019 13:45	00d 00:05:00.0	64.7	89.5	72.3	63.2	-.-	65.7	65.2	64.6	63.7	63.5	----	-----
23	10/23/2019 13:50	00d 00:05:00.0	62.9	87.7	69	58.3	-.-	66.4	65.6	62.1	59.8	59.4	----	-----
24	10/23/2019 13:55	00d 00:05:00.0	65.2	90	76.9	61.4	-.-	66.3	66	64.5	63.6	63.3	----	-----
25	10/23/2019 14:00	00d 00:05:00.0	67.5	92.3	82.7	57.5	-.-	71.8	69	63.7	59.3	58.8	----	-----
26	10/23/2019 14:05	00d 00:05:00.0	68.9	93.7	78.9	60.9	-.-	74	71.7	65.8	62	61.5	----	-----
27	10/23/2019 14:10	00d 00:05:00.0	63.9	88.7	68.3	60.4	-.-	66	65.5	64.1	61.5	61.3	----	-----
28	10/23/2019 14:15	00d 00:05:00.0	62.4	87.2	68.7	60.3	-.-	64.1	63.5	61.9	61.1	60.9	----	-----
29	10/23/2019 14:20	00d 00:05:00.0	66.4	91.2	78.3	61.6	-.-	71.3	68.4	63.6	62.2	61.9	----	-----
30	10/23/2019 14:25	00d 00:05:00.0	67.5	92.3	78.7	57.8	-.-	74	70.5	63.5	61.3	59.5	----	-----
31	10/23/2019 14:30	00d 00:05:00.0	63.4	88.2	77.6	55	-.-	69.8	65.5	59	56.4	55.8	----	-----
32	10/23/2019 14:35	00d 00:05:00.0	62.7	87.5	74.5	52.9	-.-	70.3	66.9	57.3	54.5	54	----	-----
33	10/23/2019 14:40	00d 00:05:00.0	74	98.8	90.5	57.9	-.-	80.1	72.6	64.2	59.9	59.5	----	-----
34	10/23/2019 14:45	00d 00:05:00.0	64.3	89.1	76.5	58.4	-.-	70	67	61.4	59.4	59.1	----	-----
35	10/23/2019 14:50	00d 00:05:00.0	59.5	84.3	65	56.3	-.-	62.3	61.4	59	57	56.8	----	-----
36	10/23/2019 14:55	00d 00:05:00.0	63.1	87.9	76.7	57.2	-.-	67.9	64.8	60.8	58.8	58.3	----	-----
37	10/23/2019 15:00	00d 00:05:00.0	64.4	89.2	78	59.4	-.-	69.4	64.9	61.6	60.5	60.1	----	-----
38	10/23/2019 15:05	00d 00:05:00.0	66.1	90.9	79.3	59	-.-	70.9	69.4	62.4	59.9	59.6	----	-----
39	10/23/2019 15:10	00d 00:05:00.0	62.7	87.5	70.3	58.9	-.-	66.8	65	61.5	60	59.7	----	-----
40	10/23/2019 15:15	00d 00:05:00.0	61.9	86.7	69.7	57.2	-.-	66.2	64.2	60.5	58.1	57.8	----	-----
41	10/23/2019 15:20	00d 00:05:00.0	60.6	85.4	71.2	55.9	-.-	63.8	62.7	59.7	57.5	57	----	-----
42	10/23/2019 15:25	00d 00:05:00.0	59.3	84.1	66.2	55.2	-.-	62.7	61.5	58.4	56.8	56.1	----	-----
43	10/23/2019 15:30	00d 00:05:00.0	58.8	83.6	64.9	56.4	-.-	60.9	59.8	58.5	57.4	57.3	----	-----
44	10/23/2019 15:35	00d 00:05:00.0	61.7	86.5	75.2	55	-.-	66.6	63.7	57.7	55.9	55.6	----	-----
45	10/23/2019 15:40	00d 00:05:00.0	57.9	82.7	67.3	55.3	-.-	60.4	59.6	57.3	56.1	55.9	----	-----
46	10/23/2019 15:45	00d 00:05:00.0	59	83.8	65.2	55.9	-.-	62.7	61.1	58.1	57.1	56.8	----	-----
47	10/23/2019 15:50	00d 00:05:00.0	59.7	84.5	70.3	55	-.-	64	62.4	57.7	56.3	56.1	----	-----
48	10/23/2019 15:55	00d 00:05:00.0	55.8	80.6	61.9	53.9	-.-	58	57.2	55.3	54.6	54.3	----	-----
49	10/23/2019 16:00	00d 00:05:00.0	64.5	89.3	79.3	53.6	-.-	70.3	66.3	56.8	54.8	54.4	----	-----

test 1 (10/23/19)-(10/24-19)

Time Finish	Start row	Stop row	LAEQ				
"""12:00-18:00"""	2	74	65.43135584	3492493.318	$D$2:$D$74	$D$2	$D$74
"""18:00-24:00"""	74	146	60.79753139	1201581.24	$D$74:$D$146	$D$74	$D$146
00:00-04:25	146	199	62.98334212	1987623.907	$D$146:$D$199	$D$146	$D$199
	4	4	69	7943282.347	$D$4:$D$4	$D$4	$D$4
14.5 hr avg	2	291	61.88363108	1542989.988	$D$2:$D$291	$D$2	$D$291
	4	4	69	7943282.347	$D$4:$D$4	$D$4	$D$4
	4	4	69	7943282.347	$D$4:$D$4	$D$4	$D$4

50	10/23/2019 16:05	00d 00:05:00.0	57.9	82.7	66.6	53.4	-.-	61.3	60.3	57.2	54.6	54.2	----	-----
51	10/23/2019 16:10	00d 00:05:00.0	62.5	87.3	75.3	57	-.-	68.4	64.5	59.3	58.2	57.8	----	-----
52	10/23/2019 16:15	00d 00:05:00.0	60.3	85.1	67.5	56.7	-.-	63.1	61.8	59.7	57.9	57.5	----	-----
53	10/23/2019 16:20	00d 00:05:00.0	63.1	87.9	78.8	56.8	-.-	67.5	64.9	59.5	57.8	57.6	----	-----
54	10/23/2019 16:25	00d 00:05:00.0	61	85.8	67.6	57.2	-.-	63	62.3	60.6	59.2	58.7	----	-----
55	10/23/2019 16:30	00d 00:05:00.0	61.2	86	72.1	57.3	-.-	65.3	63.2	59.3	58.5	58.3	----	-----
56	10/23/2019 16:35	00d 00:05:00.0	58.8	83.6	64.7	56.8	-.-	60.6	59.9	58.5	57.5	57.2	----	-----
57	10/23/2019 16:40	00d 00:05:00.0	65.9	90.7	81.7	54.5	-.-	70.8	68.3	59.8	56.1	55.2	----	-----
58	10/23/2019 16:45	00d 00:05:00.0	58.6	83.4	62.1	55.5	-.-	60.9	60.5	58.4	56.4	56.1	----	-----
59	10/23/2019 16:50	00d 00:05:00.0	59.7	84.5	70.5	55.5	-.-	63.3	61.8	58.4	57	56.8	----	-----
60	10/23/2019 16:55	00d 00:05:00.0	62.2	87	68.2	55.4	-.-	66.1	65.8	59.9	57.2	56.9	----	-----
61	10/23/2019 17:00	00d 00:05:00.0	60.7	85.5	73.5	57.9	-.-	63.2	61.8	59.9	58.6	58.4	----	-----
62	10/23/2019 17:05	00d 00:05:00.0	62.2	87	74.2	54.8	-.-	67.4	65.3	59.1	56.1	55.7	----	-----
63	10/23/2019 17:10	00d 00:05:00.0	66.1	90.9	80	56.1	-.-	72.7	69.5	60	57.4	57.2	----	-----
64	10/23/2019 17:15	00d 00:05:00.0	59.9	84.7	68.6	56.5	-.-	62.6	61.3	59.1	57.6	57.3	----	-----
65	10/23/2019 17:20	00d 00:05:00.0	60.7	85.5	68.2	57.3	-.-	62.7	62.1	60.1	58.8	58.5	----	-----
66	10/23/2019 17:25	00d 00:05:00.0	62.9	87.7	74.6	57.1	-.-	68.9	66.4	59.3	57.8	57.7	----	-----
67	10/23/2019 17:30	00d 00:05:00.0	67.3	92.1	83	56.4	-.-	71.7	66.6	63	58.2	57.6	----	-----
68	10/23/2019 17:35	00d 00:05:00.0	63.4	88.2	67.1	56.7	-.-	66.4	66.2	61.1	58	57.4	----	-----
69	10/23/2019 17:40	00d 00:05:00.0	65.8	90.6	81.5	55.9	-.-	70.1	66.3	59.5	57.4	56.6	----	-----
70	10/23/2019 17:45	00d 00:05:00.0	59.2	84	65	57.2	-.-	61.1	60.6	58.8	58	57.9	----	-----
71	10/23/2019 17:50	00d 00:05:00.0	63.7	88.5	79.9	57.2	-.-	66	61.5	58.9	57.8	57.7	----	-----
72	10/23/2019 17:55	00d 00:05:00.0	59.2	84	69.8	55.9	-.-	63.2	61.2	57.8	56.6	56.5	----	-----
73	10/23/2019 18:00	00d 00:05:00.0	59	83.8	62.4	56.8	-.-	60.4	60.2	58.7	57.6	57.5	----	-----
74	10/23/2019 18:05	00d 00:05:00.0	61	85.8	75.1	56.4	-.-	65.6	62.6	58.9	57	56.8	----	-----
75	10/23/2019 18:10	00d 00:05:00.0	63.1	87.9	77.4	55.4	-.-	69.1	62.8	57.3	56.5	56.2	----	-----
76	10/23/2019 18:15	00d 00:05:00.0	58.9	83.7	69.1	56.2	-.-	61.6	60.5	58.1	57.1	56.9	----	-----
77	10/23/2019 18:20	00d 00:05:00.0	63.8	88.6	76.9	57.3	-.-	66.3	64.5	63.2	58.5	57.9	----	-----
78	10/23/2019 18:25	00d 00:05:00.0	61.5	86.3	64.2	57.7	-.-	63.4	63.2	62	58.9	58.5	----	-----
79	10/23/2019 18:30	00d 00:05:00.0	59.9	84.7	63.4	58.1	-.-	61.6	61	59.7	58.7	58.6	----	-----
80	10/23/2019 18:35	00d 00:05:00.0	61.7	86.5	74.6	57.5	-.-	65.2	63.3	59.6	58.2	58.1	----	-----
81	10/23/2019 18:40	00d 00:05:00.0	61.4	86.2	69.9	56.5	-.-	65.8	64.5	59.3	57.8	57.4	----	-----
82	10/23/2019 18:45	00d 00:05:00.0	59.3	84.1	65.3	56.2	-.-	62.4	60.7	58.8	57.1	56.8	----	-----
83	10/23/2019 18:50	00d 00:05:00.0	59.1	83.9	62.3	56.9	-.-	60.7	60.2	58.9	57.8	57.6	----	-----
84	10/23/2019 18:55	00d 00:05:00.0	59.3	84.1	62.2	57.5	-.-	61	60.4	59.1	58.1	58	----	-----
85	10/23/2019 19:00	00d 00:05:00.0	58.7	83.5	62.8	56.7	-.-	61	59.9	58.4	57.5	57.2	----	-----
86	10/23/2019 19:05	00d 00:05:00.0	58.1	82.9	65.6	55.5	-.-	60.6	59.6	57.6	56.2	56	----	-----
87	10/23/2019 19:10	00d 00:05:00.0	58.2	83	64.4	55.4	-.-	60.4	59.2	57.9	56.7	56.2	----	-----
88	10/23/2019 19:15	00d 00:05:00.0	61	85.8	75.4	55.2	-.-	65.3	63.1	57.4	56.2	55.9	----	-----
89	10/23/2019 19:20	00d 00:05:00.0	57.3	82.1	62.7	54.3	-.-	60	59.3	56.8	55.5	54.9	----	-----
90	10/23/2019 19:25	00d 00:05:00.0	62.9	87.7	77.2	56	-.-	67.7	65.1	58.1	56.6	56.4	----	-----
91	10/23/2019 19:30	00d 00:05:00.0	64.6	89.4	82.3	56	-.-	69.3	64.3	58.9	56.9	56.5	----	-----
92	10/23/2019 19:35	00d 00:05:00.0	59.7	84.5	75.4	56.5	-.-	61.8	60.1	58.2	57.3	57.1	----	-----
93	10/23/2019 19:40	00d 00:05:00.0	58.5	83.3	64.1	56.6	-.-	60.8	60.4	58	57.2	57.1	----	-----
94	10/23/2019 19:45	00d 00:05:00.0	59.2	84	71.9	56.2	-.-	61.9	61.2	58.1	57	56.9	----	-----
95	10/23/2019 19:50	00d 00:05:00.0	63	87.8	78	54.2	-.-	67.7	63.7	57.2	55.5	55.1	----	-----
96	10/23/2019 19:55	00d 00:05:00.0	59.6	84.4	73.5	54.1	-.-	63.8	62.2	56.4	54.9	54.8	----	-----
97	10/23/2019 20:00	00d 00:05:00.0	60.8	85.6	66.3	56.7	-.-	64.2	63.8	58.6	57.3	57.2	----	-----
98	10/23/2019 20:05	00d 00:05:00.0	58.1	82.9	63.9	55.6	-.-	60.2	59.5	57.8	56.8	56.6	----	-----
99	10/23/2019 20:10	00d 00:05:00.0	57.8	82.6	63.8	55.7	-.-	59.6	58.9	57.5	56.3	56.2	----	-----
100	10/23/2019 20:15	00d 00:05:00.0	57.7	82.5	68.3	54.6	-.-	61.9	59.9	56.3	55.5	55.2	----	-----
101	10/23/2019 20:20	00d 00:05:00.0	60.5	85.3	75.4	54	-.-	64.5	62.8	57.1	54.7	54.5	----	-----
102	10/23/2019 20:25	00d 00:05:00.0	62.2	87	76.7	54.9	-.-	67.1	62.7	58.6	57.5	56.9	----	-----
103	10/23/2019 20:30	00d 00:05:00.0	59.9	84.7	63	58.6	-.-	60.8	60.6	59.8	59	58.9	----	-----
104	10/23/2019 20:35	00d 00:05:00.0	63	87.8	67.3	58.2	-.-	66.8	66.6	60	59.1	58.9	----	-----
105	10/23/2019 20:40	00d 00:05:00.0	61.3	86.1	70.9	58.5	-.-	63.7	61.9	60.2	59.2	59.1	----	-----
106	10/23/2019 20:45	00d 00:05:00.0	58.7	83.5	64.7	56.5	-.-	60.2	59.8	58.6	57.1	57	----	-----

107	10/23/2019 20:50	00d 00:05:00.0	58.5	83.3	66.6	56.6	-.-	60.8	60	57.9	56.9	56.8	----	-----
108	10/23/2019 20:55	00d 00:05:00.0	63.6	88.4	77.7	55.7	-.-	69.4	65.7	58.4	56.5	56.3	----	-----
109	10/23/2019 21:00	00d 00:05:00.0	58.5	83.3	63.1	54.8	-.-	60.6	60.2	58.4	55.6	55.4	----	-----
110	10/23/2019 21:05	00d 00:05:00.0	61.9	86.7	76.6	57	-.-	65.7	61.8	59.1	57.9	57.7	----	-----
111	10/23/2019 21:10	00d 00:05:00.0	59.3	84.1	70.7	56.4	-.-	61.8	60.7	58.5	57.1	57	----	-----
112	10/23/2019 21:15	00d 00:05:00.0	62.4	87.2	75.7	57.4	-.-	67.1	63	58.9	58	57.9	----	-----
113	10/23/2019 21:20	00d 00:05:00.0	61.3	86.1	64.7	57	-.-	63.9	63.4	61.4	58.4	57.7	----	-----
114	10/23/2019 21:25	00d 00:05:00.0	61.3	86.1	66.5	55.1	-.-	64.8	64.2	61.2	56.4	55.7	----	-----
115	10/23/2019 21:30	00d 00:05:00.0	58.2	83	67.1	55.8	-.-	60.9	59.6	57.3	56.4	56.2	----	-----
116	10/23/2019 21:35	00d 00:05:00.0	61.6	86.4	78.4	55.1	-.-	64.4	61.5	57	55.9	55.6	----	-----
117	10/23/2019 21:40	00d 00:05:00.0	61.6	86.4	78.9	54.2	-.-	65.1	62.6	56.4	54.9	54.7	----	-----
118	10/23/2019 21:45	00d 00:05:00.0	58.6	83.4	62.6	56.7	-.-	61.4	60.5	57.9	57.3	57.1	----	-----
119	10/23/2019 21:50	00d 00:05:00.0	61.8	86.6	74.4	57.2	-.-	65.3	62.8	60.1	58	57.9	----	-----
120	10/23/2019 21:55	00d 00:05:00.0	62.5	87.3	75.3	56.2	-.-	66	63.2	60.3	57.6	57.2	----	-----
121	10/23/2019 22:00	00d 00:05:00.0	60.5	85.3	68.7	56.1	-.-	64.7	63.2	58.6	57	56.9	----	-----
122	10/23/2019 22:05	00d 00:05:00.0	61.7	86.5	75.6	54.6	-.-	64.4	63.5	58.7	56.5	56	----	-----
123	10/23/2019 22:10	00d 00:05:00.0	64.9	89.7	78.9	55.6	-.-	68.6	66.8	58.9	56.7	56.2	----	-----
124	10/23/2019 22:15	00d 00:05:00.0	65.1	89.9	75.4	57	-.-	66.7	66.5	65.9	57.8	57.6	----	-----
125	10/23/2019 22:20	00d 00:05:00.0	58.4	83.2	68.2	56.6	-.-	60.5	60	57.8	57.2	57.1	----	-----
126	10/23/2019 22:25	00d 00:05:00.0	61.2	86	71.1	55.9	-.-	66.9	63.8	58.3	56.8	56.5	----	-----
127	10/23/2019 22:30	00d 00:05:00.0	58.3	83.1	62.5	55.3	-.-	61.1	59.4	58	56.3	56	----	-----
128	10/23/2019 22:35	00d 00:05:00.0	57.2	82	61.7	55.3	-.-	58.8	58.1	56.9	56.2	56	----	-----
129	10/23/2019 22:40	00d 00:05:00.0	59.9	84.7	73.8	54.5	-.-	64.9	62.6	56.8	55.3	55.2	----	-----
130	10/23/2019 22:45	00d 00:05:00.0	56.4	81.2	62.8	54.7	-.-	58.3	57.2	56	55.2	55.1	----	-----
131	10/23/2019 22:50	00d 00:05:00.0	62.2	87	76.1	55.2	-.-	65.8	63.1	58.6	56.2	56	----	-----
132	10/23/2019 22:55	00d 00:05:00.0	58.9	83.7	63.5	57.1	-.-	60.1	59.6	58.7	58	57.8	----	-----
133	10/23/2019 23:00	00d 00:05:00.0	59.5	84.3	64	57.1	-.-	61.9	61.3	59	57.6	57.5	----	-----
134	10/23/2019 23:05	00d 00:05:00.0	59.4	84.2	62.9	57.2	-.-	61.1	60.6	59.1	58.2	57.9	----	-----
135	10/23/2019 23:10	00d 00:05:00.0	58.5	83.3	62.4	55.8	-.-	60.1	59.6	58.4	57	56.7	----	-----
136	10/23/2019 23:15	00d 00:05:00.0	56.7	81.5	60.6	54.8	-.-	59	57.8	56.6	55.4	55.3	----	-----
137	10/23/2019 23:20	00d 00:05:00.0	58.3	83.1	66.7	55.6	-.-	61	59.8	57.8	56.4	56.1	----	-----
138	10/23/2019 23:25	00d 00:05:00.0	58.4	83.2	63.7	56.7	-.-	60.6	59.5	58.1	57.5	57.4	----	-----
139	10/23/2019 23:30	00d 00:05:00.0	60.8	85.6	75	55.3	-.-	65.8	61.3	57	56.4	56.2	----	-----
140	10/23/2019 23:35	00d 00:05:00.0	57.3	82.1	62.5	55.1	-.-	58.5	58	57	56.3	56.1	----	-----
141	10/23/2019 23:40	00d 00:05:00.0	57.2	82	59.4	55.2	-.-	58.2	57.9	57.2	56.4	56.1	----	-----
142	10/23/2019 23:45	00d 00:05:00.0	57.4	82.2	60	55.5	-.-	58.5	58.3	57.4	56.5	56.3	----	-----
143	10/23/2019 23:50	00d 00:05:00.0	65	89.8	85.1	55.1	-.-	68.4	65.5	58.6	56.2	55.7	----	-----
144	10/23/2019 23:55	00d 00:05:00.0	62.1	86.9	73.3	56.4	-.-	67.6	64.6	58.9	57.4	57.2	----	-----
145	10/24/2019 0:00	00d 00:05:00.0	62.4	87.2	74	56.1	-.-	66.6	66.2	59.7	57.8	57.4	----	-----
146	10/24/2019 0:05	00d 00:05:00.0	68	92.8	77.5	58.6	-.-	75.5	74.2	62.2	59.5	59.3	----	-----
147	10/24/2019 0:10	00d 00:05:00.0	61.3	86.1	65.1	57.5	-.-	63.8	63.5	61.6	58.5	58.1	----	-----
148	10/24/2019 0:15	00d 00:05:00.0	61	85.8	65.4	57.5	-.-	63.9	63.2	60.1	58.4	58.3	----	-----
149	10/24/2019 0:20	00d 00:05:00.0	61.3	86.1	68.3	57.6	-.-	64.3	63.5	60.2	58.5	58.2	----	-----
150	10/24/2019 0:25	00d 00:05:00.0	61.9	86.7	75.2	56.9	-.-	66	63.2	58.2	57.5	57.4	----	-----
151	10/24/2019 0:30	00d 00:05:00.0	59.4	84.2	74.5	56.7	-.-	60.7	59.7	58.1	57.4	57.2	----	-----
152	10/24/2019 0:35	00d 00:05:00.0	57.7	82.5	63.1	55.9	-.-	59.1	58.5	57.5	56.9	56.7	----	-----
153	10/24/2019 0:40	00d 00:05:00.0	57.8	82.6	64	55.9	-.-	59.6	59	57.5	56.7	56.5	----	-----
154	10/24/2019 0:45	00d 00:05:00.0	63	87.8	76.8	55.9	-.-	68.1	64.8	57.8	56.7	56.4	----	-----
155	10/24/2019 0:50	00d 00:05:00.0	58.1	82.9	62.1	55.2	-.-	59.4	59.3	58.1	56.1	55.9	----	-----
156	10/24/2019 0:55	00d 00:05:00.0	57.9	82.7	64.4	55.5	-.-	60.5	59.3	57.4	56.5	56.3	----	-----
157	10/24/2019 1:00	00d 00:05:00.0	60.3	85.1	65.7	58.7	-.-	61.5	61	60.1	59.5	59.3	----	-----
158	10/24/2019 1:05	00d 00:05:00.0	58.9	83.7	65.4	56.6	-.-	60.7	60.2	58.7	57.5	57.3	----	-----
159	10/24/2019 1:10	00d 00:05:00.0	57.7	82.5	64.6	55.9	-.-	58.5	58.2	57.5	56.8	56.6	----	-----
160	10/24/2019 1:15	00d 00:05:00.0	58	82.8	60.4	56.4	-.-	58.9	58.6	57.9	57.2	57	----	-----
161	10/24/2019 1:20	00d 00:05:00.0	57.5	82.3	60.1	56.1	-.-	58.4	58.1	57.4	56.9	56.8	----	-----
162	10/24/2019 1:25	00d 00:05:00.0	57.5	82.3	60.3	56	-.-	58.8	58.5	57.4	56.6	56.4	----	-----
163	10/24/2019 1:30	00d 00:05:00.0	57.1	81.9	59.5	55.3	-.-	58.2	58	57.1	56.2	56	----	-----

164	10/24/2019 1:35	00d 00:05:00.0	56.9	81.7	61.8	55.5	-.-	58.4	57.8	56.8	56	55.9	----	-----
165	10/24/2019 1:40	00d 00:05:00.0	56.3	81.1	57.5	55.2	-.-	57	56.8	56.3	55.8	55.7	----	-----
166	10/24/2019 1:45	00d 00:05:00.0	57	81.8	59.4	55.7	-.-	58	57.7	57	56.3	56.2	----	-----
167	10/24/2019 1:50	00d 00:05:00.0	57.2	82	61.4	55.7	-.-	58.6	58	57	56.3	56.2	----	-----
168	10/24/2019 1:55	00d 00:05:00.0	57.9	82.7	69.6	55.1	-.-	61.5	58.8	56.5	55.9	55.8	----	-----
169	10/24/2019 2:00	00d 00:05:00.0	56.5	81.3	64.8	54.6	-.-	58.6	57	55.8	55.2	55	----	-----
170	10/24/2019 2:05	00d 00:05:00.0	56.6	81.4	64.7	54.5	-.-	57.6	57	56.3	55.3	55.1	----	-----
171	10/24/2019 2:10	00d 00:05:00.0	56.8	81.6	58.2	55.5	-.-	57.4	57.3	56.8	56.3	56.2	----	-----
172	10/24/2019 2:15	00d 00:05:00.0	57.9	82.7	69.8	55.6	-.-	60	58.6	56.8	56.4	56.2	----	-----
173	10/24/2019 2:20	00d 00:05:00.0	64.6	89.4	80.6	55.8	-.-	70.1	66.6	57.1	56.4	56.2	----	-----
174	10/24/2019 2:25	00d 00:05:00.0	64.4	89.2	77.7	56.6	-.-	72	66.8	60.8	57.5	57	----	-----
175	10/24/2019 2:30	00d 00:05:00.0	65.8	90.6	81.3	58.2	-.-	70.2	64.4	61.2	59.3	59	----	-----
176	10/24/2019 2:35	00d 00:05:00.0	63.7	88.5	74.5	60.2	-.-	65.8	65.1	63	60.9	60.7	----	-----
177	10/24/2019 2:40	00d 00:05:00.0	65.5	90.3	74.9	61.4	-.-	69.3	66.9	64.7	62.4	62.1	----	-----
178	10/24/2019 2:45	00d 00:05:00.0	67.4	92.2	80.8	59	-.-	73.1	69.3	63.4	59.9	59.6	----	-----
179	10/24/2019 2:50	00d 00:05:00.0	66.2	91	78.6	60.3	-.-	71.1	67.5	62.7	61.1	60.9	----	-----
180	10/24/2019 2:55	00d 00:05:00.0	61.5	86.3	70.2	58.7	-.-	63.2	62.5	61.2	60.5	60	----	-----
181	10/24/2019 3:00	00d 00:05:00.0	63.4	88.2	75.2	57.6	-.-	68.4	68.1	60.9	58.8	58.3	----	-----
182	10/24/2019 3:05	00d 00:05:00.0	62.5	87.3	74.4	58.1	-.-	65.4	62.6	60.2	59.2	58.8	----	-----
183	10/24/2019 3:10	00d 00:05:00.0	60.8	85.6	67.3	56.5	-.-	63.9	63	60	58	57.5	----	-----
184	10/24/2019 3:15	00d 00:05:00.0	67.5	92.3	83	56.7	-.-	71.7	69.9	62.3	57.7	57.5	----	-----
185	10/24/2019 3:20	00d 00:05:00.0	61	85.8	72	55	-.-	64.8	63.1	59.8	56.2	56	----	-----
186	10/24/2019 3:25	00d 00:05:00.0	61.9	86.7	78.3	55.3	-.-	67.2	62.2	57.3	56.3	56.1	----	-----
187	10/24/2019 3:30	00d 00:05:00.0	57.8	82.6	65.6	56	-.-	59.8	58.8	57.4	56.7	56.5	----	-----
188	10/24/2019 3:35	00d 00:05:00.0	59.4	84.2	72	55.1	-.-	62.2	61.3	57.7	56.1	55.8	----	-----
189	10/24/2019 3:40	00d 00:05:00.0	66.4	91.2	68.6	60.1	-.-	67.7	67.6	67.1	61.1	60.7	----	-----
190	10/24/2019 3:45	00d 00:05:00.0	65.5	90.3	70.3	60.2	-.-	67.6	67.2	65.2	62.1	61	----	-----
191	10/24/2019 3:50	00d 00:05:00.0	67.1	91.9	76.3	58.8	-.-	73	70.7	65	62	60.5	----	-----
192	10/24/2019 3:55	00d 00:05:00.0	61.4	86.2	67.7	58.1	-.-	63.6	62.9	61	59.6	59.3	----	-----
193	10/24/2019 4:00	00d 00:05:00.0	65.1	89.9	79.6	57.2	-.-	71	67.5	60.3	58.8	58.5	----	-----
194	10/24/2019 4:05	00d 00:05:00.0	67.2	92	79.1	59.6	-.-	69.6	67.7	67	61.2	61	----	-----
195	10/24/2019 4:10	00d 00:05:00.0	62.3	87.1	75.5	59.7	-.-	64.4	63.4	61.5	60.3	60.2	----	-----
196	10/24/2019 4:15	00d 00:05:00.0	64.5	89.3	76.6	59.2	-.-	70.8	67.5	61.2	59.7	59.6	----	-----
197	10/24/2019 4:20	00d 00:05:00.0	66	90.8	80.1	57.9	-.-	72.8	69.5	59.8	58.7	58.5	----	-----
198	10/24/2019 4:25	00d 00:02:13.8	68	89.3	80	58.1	-.-	76.3	71.3	60.2	58.8	58.6	----	-----

Attachment H

Photographs/Rendering of Truck Rack

envirospec ENGINEERING, PLLC

Attachment H - Photographs

JOB NAME Global Albany SEQR
JOB # E19-2191
LOCATION Albany, NY

Date: 2/25/20

Time: 4:12 PM

Comments:

Global Albany Truck Loading Rack

Date: 2/25/20

Time: 4:19 PM

Comments:

Global Albany Truck Loading Rack

Date: 2/25/20

Time: 4:19 PM

Comments:

Global Albany Truck Loading Rack

Date: 2/25/20

Time: 4:06 PM

Comments:

Global Albany Rail Rack

Date: 2/25/20

Time: 4:08 PM

Comments:

Global Albany Rail Rack

Date: 2/25/20

Time: 4:08 PM

Comments:

Global Albany Rail Rack

envirospec ENGINEERING, PLLC

Attachment H – Rendering of Truck Rack

JOB NAME__Global Albany SEQR__

JOB #__E19-2191__

LOCATION___Albany, NY___

Attachment XIII

Modeling Protocol

PART 212 REVIEW
AIR DISPERSION MODEL PROTOCOL
ALBANY, NY

Revised

April 2021

Prepared for:

Global Companies LLC

800 South Street

Waltham, MA 02454

Prepared by:

envirospec ENGINEERING, PLLC

349 Northern Blvd, Suite 3
Albany, NY 12204

Envirospec Engineering Project E21-2818

1.0 Introduction:

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

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

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

The air dispersion model will be completed using Lakes AERMOD View Software (version 9.9.5). Emissions information can be found below which provides information on variables and modeling assumptions which will be used when developing the model.

2.0 Facility Overview and Process Description:

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

3.0 Modeling Methodology:

The projection to be used for the model will be UTM WGS84, zone 18. An aerial image of the site as well as a facility site plan will be imported as base maps and 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 Lakes AERMOD View software will be used.

3.2 Site Characterization:

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

3.3 Source Emissions:

3.3.1 Benzene Model

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

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

Liquid weight concentrations for benzene for crude and distillate will be based on speciation data from API 19.4. A benzene liquid weight concentration of 1.8% will be used for gasoline. Vapor weight concentrations calculations for each month of the year were completed based on AP-42 Chapter 7 as part of the PTE. The benzene emissions were determined for each month of the year for each tank. The total benzene emissions for each tank based on these calculations for the worst-case product in each tank will be used in the model.

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

The attached tables summarize the parameters assumed for the modeling (Attachment 1). Detailed calculations are also provided in Attachment 2. Several different iterations representing different throughputs at each rack will be completed to determine the impact on the model results.

3.3.1.1 Gasoline Storage Tanks:

The facility currently has ten (10) gasoline storage tanks. The tanks are equipped with internal floating roofs and have varying capacities. Each tank will be modeled as a volume source with actual tank height as the release height, and actual tank dimensions will be used to determine the initial horizontal and vertical dimensions.

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. Runs will also be completed assuming that the worst two tank landings are occurring simultaneously based on model results. Cleanings will also be modeled.

3.3.1.2 Distillate Storage Tanks:

The facility currently has five (5) vertical fixed roof (VFR) distillate storage tanks with two (2) of those being heated. Each tank will be modeled as a volume source with actual tank height as the release height, and actual tank dimensions will be used to determine the initial horizontal and vertical dimensions.

3.3.1.3 Truck Loading Rack:

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

3.3.1.4 Rail Loading:

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

3.3.1.5 Marine Loading:

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

3.3.2 Non-HTAC Modeling

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

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

The calculated hourly ERPs for the non-HTACs listed above are summarized in Attachment 3. Though the PTE also included naphthalene and cumene, actual emissions for 2020 for these were 20.49 lb/yr and 25.63 lb/yr for all sources for which actuals were reported. Therefore, these HAPs are not included in the hourly ERP evaluation or in the modeling protocol.

Modeling will be completed for each of the non-HTACs in the hourly ERP evaluation to determine the final Environmental Rating (ER) for each non-HTAC. The initial ERs, based on toxicity alone, are B for hexane, 2,2,4-TMP, ethylbenzene, and xylene and C for toluene.

Emission rates from each source will be calculated using the same methodology as for benzene, which is outlined in Attachment 2, with the speciation for each non-HTAC used instead of the speciation for benzene. The worst-case speciation for each non-HTAC at each source would be used in the modeling, depending on the product loaded. The emission rates used in the model will be provided in the report.

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
ethylbenzene	1,000	NA
xylenes	100	22,000

3.3.3 H_2S Model

Modeling will be completed for potential H_2S emissions for each of the IFR tanks storing crude oil. A separate table of the parameters used in the annual model is attached, which includes details on the emissions calculations. Each tank will be modeled as a volume source with actual tank height as the release height, and actual tank dimensions will be used to determine the initial horizontal and vertical dimensions.

Modeling will be completed for both annual emissions and hourly emission rates, assuming a vapor fraction of 0.00118. For the annual model, the H_2S vapor fraction will be multiplied by the total standing and working losses from crude oil storage in each tank and landing emissions, assuming one landing per tank. For the hourly model, the H_2S vapor fraction will be multiplied by the emission rate for the worst case hour during landing. Separate iterations of the model will be completed with one tank landing at a time with the annual emission rate modeled at each of the other tanks to determine the worst case hourly impacts. Additional details on these calculations are provided in the attachments to this protocol.

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

3.4 Building Downwash Analysis:

All of the storage tanks at the facility, as well as office buildings, 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 Albany International Airport in Colonie, NY located approximately 8 miles northwest of the terminal. This station was chosen because of its close proximity to the terminal.

3.6 Modeled Receptors

Boundary receptors 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. Elevations (above mean sea level) corresponding to the base elevation of the facility will be assigned to all sources and buildings at the facility, as well as the modeled receptors.

The terrain processor for AERMOD, AERMAP Version 19191 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, non-HTACs with actual annual emissions greater than 100 lb/yr, and H_2S 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

Global Albany Annual Benzene Model Assumptions

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		WGS84
UTM Zone		18
Hemisphere		Northern
AERMET		2015-2019 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Truck Rack VRU (VRUTK) (Point Source)		
Emission Rate (lb/hr)	Model Iteration-Dependent, see Calculations Attachment	
Stack Height (ft)	Actual Stack Height	22.4
Stack Temperature	Release Temperature	Ambient
Stack Velocity (m/s)	Assumed	0.003
Stack Diameter (ft)	Actual Stack Diameter	1
Emissions Limit (mg/L)		2
Rail VCU (VCURR) (Point Source)		
Emission Rate (lb/hr)	Model Iteration-Dependent, see Calculations Attachment	
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1350
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	8
Emissions Limit (mg/L)		2
Marine VCU (VCUM1) (Point Source)		
Emission Rate (lb/hr)	Model Iteration-Dependent, see Calculations Attachment	
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	6
Emissions Limit (mg/L)		10
Marine VCU (VCUM2) (Point Source)		
Emission Rate (lb/hr)	Model Iteration-Dependent, see Calculations Attachment	
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Truck Fugitives (Volume Source) (OS#4 Only)		
Emission Rate (lb/hr)	Model Iteration-Dependent, see Calculations Attachment	
Release Height (ft)	Center of Plume	10
Initial Horizontal Dimension (ft)	Length of Side divided by 4.3	31.4
Initial Vertical Dimension (ft)	Center of Plume height divided by 2.15	4.65
Barge Fugitives (Area Source) Refined and Blendstock Loading OS#2 or Crude OS#2 Only		
Emission Rate (lb/hr/ft^2)	Model Iteration-Dependent, see Calculations Attachment	
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft^2)	Barge Area	9178.8
Rail Fugitives (Volume Source) OS#5 Only		
Emission Rate (lb/hr)	Model Iteration-Dependent, see Calculations Attachment	
Release Height (ft)	Release Height	17
Initial Horizontal Dimension (ft)	Length of Side divided by 4.3	54.88
Initial Vertical Dimension (ft)	Center of Plume height divided by 2.15	7.91
Tank 28 (Distillate) (Volume Source)		

Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Emission Rate (lb/yr)	From PTE Calculations	5.77
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 29 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Emission Rate (lb/yr)	From PTE Calculations	5.77
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 30 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Emission Rate (lb/yr)	From PTE Calculations	5.77
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 33 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.55E-04
Emission Rate (lb/yr)	From PTE Calculations	5.74
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 64 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	5.40E-04
Emission Rate (lb/yr)	From PTE Calculations	4.73
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.56E-03
Emission Rate (lb/yr)	From PTE Calculations	83.73
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.56E-03
Emission Rate (lb/yr)	From PTE Calculations	83.75
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	8.29E-03
Emission Rate (lb/yr)	From PTE Calculations	72.63
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 120 (Gasoline) (Volume Source)		

Emission Rate (lb/hr)	From PTE Calculations	6.89E-03
Emission Rate (lb/yr)	From PTE Calculations	60.36
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	8.86E-03
Emission Rate (lb/yr)	From PTE Calculations	77.59
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.10E-02
Emission Rate (lb/yr)	From PTE Calculations	96.20
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.84E-03
Emission Rate (lb/yr)	From PTE Calculations	59.92
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.43E-03
Emission Rate (lb/yr)	From PTE Calculations	82.57
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	9.99E-03
Emission Rate (lb/yr)	From PTE Calculations	87.49
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.51E-02
Emission Rate (lb/yr)	From PTE Calculations	132.00
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	3.80E-03
Emission Rate (lb/yr)	From PTE Calculations	33.27
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33

Global Albany Hourly Benzene Model Assumptions

General Parameters		
Parameter		**Value**
Projection		**UTM**
Datum		WGS84
UTM Zone		18
Hemisphere		Northern
AERMET		2015-2019 MET Data
AERMAP		1-deg DEM Data from webgis.com
Sources	**Assumptions/ Notes**	**Value**
Truck Rack VRU (VRUTK) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	1.84E-02
Stack Height (ft)	Actual Stack Height	22.4
Stack Temperature	Release Temperature	Ambient
Stack Velocity (m/s)	Assumed	0.003
Stack Diameter (ft)	Actual Stack Diameter	1
Emissions Limit (mg/L)		2
Rail VCU (VCURR) (Point Source)		
Emission Rate (lb/hr)	From PTE Calculations	2.07E-02
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1350
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	8
Emissions Limit (mg/L)		2
Marine VCU (VCUM1) (Point Source) Refined or Blendstock OS#3		
Emission Rate (lb/hr)	From PTE Calculations	0.064
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	6
Emissions Limit (mg/L)		10
Marine VCU (VCUM1) (Point Source) Crude OS#3		
Emission Rate (lb/hr)	From PTE Calculations	0.036
Stack Height (ft)	Actual Stack Height	35
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	6
Emissions Limit (mg/L)		10
Marine VCU (VCUM2) (Point Source), Refined or Blendstock OS#1 or OS#2		
Emission Rate (lb/hr)	From PTE Calculations	0.08
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Marine VCU (VCUM2) (Point Source), Crude OS#1 or Crude OS#2		
Emission Rate (lb/hr) (if all throughput to VCUM2)	From PTE Calculations	0.05
Stack Height (ft)	Actual Stack Height	60
Stack Temperature	Release Temperature	1500
Stack Velocity (ft/s)	Assumed	50
Stack Diameter (ft)	Actual Stack Diameter	10
Emissions Limit (mg/L)		2
Truck Fugitives (Volume Source) OS#4 Only		

Emission Rate (lb/hr)	From PTE Calculations	7.37E-02
Release Height (ft)	Center of Plume	10
Initial Horizontal Dimension (ft)	Length of Side divided by 4.3	31.4
Initial Vertical Dimension (ft)	Center of Plume height divided by 2.15	4.65
Barge Fugitives (Area Source) OS#2 Only		
Emission Rate ($lb/hr/ft^2$)	From PTE Calculations	2.05E-06
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft^2)	Barge Area	9178.8
Barge Fugitives (Area Source) Crude OS#2 Only		
Emission Rate ($lb/hr/ft^2$)	From PTE Calculations	5.67E-07
Release Height (ft)	Barge Height	20
Initial Vertical Dimension (ft)	Barge height divided by 2.15	9.3
Area (ft^2)	Barge Area	9178.8
Rail Fugitives (Volume Source) OS#5 Only		
Emission Rate (lb/hr)	From PTE Calculations	8.29E-02
Release Height (ft)	Release Height	17
Initial Horizontal Dimension (ft)	Length of Side divided by 4.3	54.88
Initial Vertical Dimension (ft)	Center of Plume height divided by 2.15	7.91
Tank 28 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 29 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 30 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.59E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 33 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	6.55E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 64 (Distillate) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	5.40E-04
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 31 (Gasoline) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	9.56E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	45

Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 32 (Gasoline) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	9.56E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 39 (Gasoline) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	8.29E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	45
Diameter (ft)	Tank diameter	125
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	29.1
Initial Vertical Dimension (ft)	Tank height divided by 2.15	20.93
Tank 120 (Gasoline) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.89E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 114 (Blendstock) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	8.86E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	120
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	27.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 115 (Blendstock) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.10E-02
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 117 (Blendstock) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	6.84E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	110

Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	25.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 118 (Blendstock) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	9.43E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	100
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	23.3
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 119 (Blendstock) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	9.99E-03
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	80
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	18.6
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 121 (Blendstock) (Volume Source)		
Emission Rate (lb/hr) Not During Landing or Cleaning	From PTE Calculations	1.51E-02
Emission Rate (lb/hr) During Landing or Cleaning	Will be Iteration-Dependent and be Provided with Report	
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	150
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	34.9
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33
Tank 130 (Product/ Water Mixture) (Volume Source)		
Emission Rate (lb/hr)	From PTE Calculations	3.80E-03
Release Height (ft)	Tank height. Approx. height of roof vents	48
Diameter (ft)	Tank diameter	75
Initial Horizontal Dimension (ft)	Tank Diameter divided by 4.3	17.4
Initial Vertical Dimension (ft)	Tank height divided by 2.15	22.33