Guidelines for Calculating and Reporting Emissions from Bulk Loading Operations November 2017

The purpose of this document is to provide operators with guidelines in estimating emissions from loading of volatile organic containing liquid materials in bulk. Loading losses are the primary source of evaporative emissions that occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of: (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded.

In addition to VOC emissions from evaporative losses, other emissions (NOx, SOx, CO, PM, and toxic air contaminants), from controlling VOC emissions by means of thermal destruction are also expected.

The following guidelines should be used to calculate annual emissions from bulk loading operations. The methodologies assume certain default parameters. Site-specific information should be used, if it is available. There are three emission scenarios for bulk loading operations:

- 1. Simple Operation (No Control)
- 2. Equipped with a Vapor Collection and Recovery System
- 3. Equipped with a Balance System and Vapor Control System

CASE 1) SIMPLE OPERATION (NO VAPOR CONTROL)

$$E_1 = Q * L_L \qquad \qquad Eq. 1$$

Where,

- E_1 = VOC Emission (un-captured vapor) from Loading Losses
- Q = Throughput in 1,000 gallons loaded
- L_L = Loading Loss Factor (lbs/1,000 Gallon Loaded) can be found in the Default Emission Factor tables or determined using information defined in US EPA AP-42, Section 5.2 as follows:

$$L_L = \frac{12.46 \times S \times P \times M}{T}$$

Where,

S = Saturation Factor (see AP-42, Table 5.2-1)

P = True Vapor Pressure, psia

M = Vapor Molecular Weight, lb/lb-mole

T = Temperature of the Liquid being Loaded, °R (°F + 460)

CASE 2) OPERATIONS EQUIPPED WITH VAPOR COLLECTION AND RECOVERY SYSTEMS

Loading emissions from this configuration consist of two parts: 1) uncollected vapor during loading; and 2) collected vapor that was further recovered by the system before exiting the recovery stack.

$$E_2 = E_{uncollected} + E_{stack} = E_{uncollected} + E_{collected} * (1 - Eff_{VR})$$
$$E_2 = Q * L_L * (1 - Eff_{VC}) + Q * L_L * Eff_{VC} * (1 - Eff_{VR})$$

$$E_2 = Q * L_L - Q * L_L * Eff_{VC} * Eff_{VR} \qquad Eq. 2$$

Where,

 E_2 = VOC Emission from Loading Losses

 Eff_{VC} = Vapor Collection Efficiency (fraction) as defined in US EPA AP-42, Section 5.2 as follows:

 $Eff_{VC} = 0.992$ for tanker trucks passing MACT-level annual leak test; or

 $Eff_{VC} = 0.987$ for tanker trucks passing the NSPS-level annual leak test; or

 $Eff_{VC} = 0.70$ for tanker trucks not passing either of the above leak tests.

 Eff_{VR} = Vapor Recovery Efficiency (fraction).

Without specific tests, Vapor Recovery Efficiency (Eff_{VR}) is assumed to be 0.95 and equation 2 becomes:

$$E_2 = Q * L_L * (1 - 0.95 * Eff_{VC}) \qquad Eq. 3$$

CASE 3) OPERATIONS EQUIPPED WITH A VAPOR BALANCE AND DESTRUCTION SYSTEM

Loading emissions from this configuration consisted of two parts: 1) uncollected vapor during loading; and 2) collected vapor that was further recovered by the system before exiting the recovery stack.

$$E_{3} = E_{uncollected} + E_{stack} = E_{uncollected} + E_{collected} * (1 - Eff_{VB}) * (1 - Eff_{VD})$$

$$E_{3} = Q * L_{L} * (1 - Eff_{VC}) + Q * L_{L} * Eff_{VC} * (1 - Eff_{VB}) * (1 - Eff_{VD})$$

$$E_{3} = Q * L_{L} * [1 - Eff_{VC} (Eff_{VB} + Eff_{VD} - (Eff_{VB} * Eff_{VD}))] \qquad Eq. 4$$

Where,

 E_3 = VOC Emission from Loading Losses

 Eff_{VC} = Vapor Collection Efficiency (fraction) as defined in US EPA AP-42, Section 5.2

 Eff_{VB} = Vapor Balance Efficiency (fraction)

 Eff_{VD} = Vapor Destruction Efficiency (fraction)

A typical system is operating with Vapor Balance Efficiency (Eff_{VB}) of 50% (or 0.50). Without specific tests, Vapor Destruction Efficiency (Eff_{VD}) is assumed to be 99% (or 0.99) and equation 4 becomes:

$$E_3 = Q * L_L * (1 - 0.995 * Eff_{VC})$$
 Eq. 5

THERMAL OXIDATION

If the operation is equipped with a VOC destruction system by means of thermal oxidation, other contaminants (NOx, SOx, CO, PM, and toxic air contaminants) resulted from burning off organic vapor are expected. AQMD encourages operators to use test results to calculate and report emissions. Since the organic vapor evaporates from loading of liquid organic materials, the captured for control vapor must be converted back into liquid form for consistency in emission calculations. The AQMD uses an equivalent method to determine the throughput of vapors directed to a thermal oxidizer (TO) as equivalent 1000 of gallons of liquid (Mgal).

$$TO_{Throughput} = \frac{E_{collected}}{1,000 * d_l} * (1 - Eff_{VB})$$

 $TO_{Throughput} = \frac{Q * L_L * Eff_{VC}}{1,000 * d_l} * (1 - Eff_{VB}) \qquad Eq.6$

A typical system is operating with Vapor Balance Efficiency (Eff_{VB}) of 50% (or 0.50). Throughput for the TO become:

$$TO_{Throughput} = 0.0005 * Eff_{VC} * \frac{Q * L_L}{d_l}$$
 Eq. 7

Where, d_l is the liquid density.

EXAMPLES

The following examples will demonstrate how emissions are calculated for a typical bulk loading operation in all three cases. The examples also included images of screens for how to report emissions under the new reporting system.

CASE 1 - SIMPLE OPERATION (NO VAPOR CONTROL)

Company XYZ splash loaded 120,000 gallons of gasoline RVP 10 at the following conditions:

S = 1.45 (Saturation Factor from AP-42)

 $T = 70^{\circ}F = 530^{\circ}R$ (Temperature of Gasoline)

P = 6.2 psia (True Vapor Pressure)

M = 66 lb/lb-mole (Vapor Molecular Weight)

$$L_{L} = \frac{12.46 \times S \times P \times M}{T} = \frac{12.46 \times 1.45 \times 6.2 \times 66}{530} = 13.95 \ lbs \ VOC/Mgal$$

Equation 1 yields the VOC emissions as follows:

$$E_1 = 120 Mgals * 13.95 \frac{lbs VOC}{Mgal} = 1,674 lbs VOC$$

Edit Emission	Edit Emission Process - Other Processes												
AER Device ID	Permit D	evice ID	A/N Process ID Rule			# Activity							
ES37				P1	462	Petroleum : Bulk	Plants and M	arineTerminals					
AER Device ID	AER D	AER Device Name											
NON-PERMITT	ED		Permit	Device ID									
Process ID		P1	Proces	ss Name		Bulk Splash Load	ing						
Process Comm	ent	Case 1 -	Simple	Operation	no Co	ntrol							
Activity Code *	Sector:												
	Industry:	um											
	Bulk Pl	ants and	MarineTerminals										
	Operatio	on:											
	Loading	g - Rail Ta	ank Car	S				•					
	Process	51											
	Gasolir	ne						•					
Rule #	462		▼ * A	Add Rule									
							Save	Cancel					

Edit Throughpu	Edit Throughput Information - Other Processes											
AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity							
ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals							
Annual Throughput												
			120.0 M	vi gal								
Annual Throughp	ut 120.	120.0 * M gal *										
Throughput Type	Inpu	Input 💌 *										
Throughput Com	ment											
					Save Cancel							

Open Criteria Em	nission Info	rmation -	Other	Processes			×					
AER Device ID	Permit De	vice ID	A/N	Process ID	Rule #	Activity						
ES37				P1	462	Petroleum : Bulk Plants and MarineTerminals						
Annual Throughput												
120.0 M gal												
Pollutant		VOC - V	olatile (Organic Comp	ounds							
Emission Factor (E	F)	13.9500		*	lbs/M gal							
	F determined after control)											
Overall Control Effi	iciency	0.00000										
Emission Factor Co	omment	Splash L	oaded	with No Contr	ols							
Emission Factor Da	ata Source	AP-42				*						
Emissions		1,674.00	lbs									
Click here to <u>delete</u> this Emission.												
						Save Cancel						

Open Toxic (TAC/ODC) Emi	Open Toxic (TAC/ODC) Emission Information - Other Processes												
AER Device ID Permit De	vice ID A/N Process ID	Rule #	Activity										
ES37	P1	462	Petroleum : Bulk Plants and MarineTerminals										
	120	.0 M gal											
TAC/ODC Toxic Pollutants / Ozone Depleting Compounds													
TAC Group	2 - Benzene												
CAS # (Pollutant)	71432 - Benzene												
Emission Factor (EF)	1.39500e-1	* lbs/M gal											
	Controlled EF value (mark checkbox if EF listed represents EF determined after control)												
Overall Control Efficiency													
Emission Factor Comment	Bezene is 1% of Total VOC	Emissions											
Emission Factor Data Source	Back-calculation		*										
Emissions	1.674e+1 lbs												
			Click here to <u>delete</u> this Emission.										
			Save Cancel										

CASE 2 - OPERATIONS EQUIPPED WITH VAPOR COLLECTION AND RECOVERY SYSTEMS

Company ABC operates a loading terminal with vapor balance service with submerged bottom filling technology into tanker trucks that have passed the MACT level leak test. The vapor vent line is connected to a refrigeration unit that recovers 95% of the vapor and returns it back as liquid to storage tank. ABC transferred 1,000,000 gallons of RVP 10 gasoline over the year at the following conditions:

- S = 1.0 (Saturation Factor from AP-42)
- T = 70° F = 530° R (Temperature of Gasoline)
- P = 6.2 psia (True Vapor Pressure)

M = 66 lb/lb-mole (Vapor Molecular Weight)

 $Eff_{VR} = 0.95$ (Vapor Recovery Efficiency)

 $Eff_{VC} = 0.992$ (Vapor Collection Efficiency)

$$L_{L} = \frac{12.46 \times S \times P \times M}{T} = \frac{12.46 \times 1 \times 6.2 \times 66}{530} = 9.62 \ lb \ VOC/Mgal$$

Equation 3 yields the VOC emissions as follows:

$$E_2 = 1,000 Mgals * 9.62 \frac{lbs VOC}{Mgal} * (1 - 0.95 * 0.992) = 554 lbs VOC$$

Edit Emiss	sion P	rocess	- Othe	r Process	es		×				
AER Device ID	P De	ermit vice ID	A/N	Process ID	Rule #	Activity					
ES37				P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading Tank Trucks : Gasoline	-				
AER Devic	e ID		ES37	AER De	vice Nan	le					
NON-PERI	МІТТЕС)		Permit [Device ID						
Process ID)		P1	Process	s Name	Bulk Loading					
Process C	ommer	nt	Case 2 - Vapor Collection and Recovery Systems								
Activity Co	de *	Sector:									
		Petrole	um		•						
		ndustry:									
		Bulk Pla	ants an	is and MarineTerminals							
	(Operatio	on:								
		Loading	g - Tan	k Trucks		•					
		Process	0								
		Gasolin	ie			•					
Rule #		462		▼ * <u>Ac</u>	<u>dd Rule</u>						
						Save Cancel					

Edit Throughput Information - Other Processes												
AER Device Permit Device A/N			Process ID	Rule #	Activity							
ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading - Tank Trucks : Gasoline							
	Annual Throughput											
					120.0 M gal							
Annual Thro	ughput		1000		* M gal • *							
Throughput	Туре		Input 💌	*								
Throughput	Comment											
					Save Cancel							

-	Open Criter	ia Emission Info	rmat	ion - Other	Proces	sses	×					
4	ER Device	Permit Device ID	A/N	Process ID	Rule #	Activity						
	ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading - Tank Trucks : Gasoline						
					Ann	ual Throughput						
						1,000.0 M gal						
	Pollutant VOC - Volatile Organic Compounds											
	Emission Factor (EF) 9.6200 * Ibs/M gal											
	Controlled EF value (mark checkbox if EF listed represents EF determined after control)											
	Overall Cont	rol Efficiency	0.94	1240								
	Emission Fa	ctor Comment	Vap 95%	or Collection	n Systei	m 99.2% Effective and Vapor Recovery System is						
	Emission Fac	ctor Data Source	AP	-42		*						
	Emissions		554.	11 lbs								
	Click here to delete this Emission.											
	Save Cancel											

Open Toxic	(TAC/ODC) Em	ission	Informatio	on - Oth	ner Processes	×							
AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity								
ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading - Tank Trucks : Gasoline								
				Ann	ual Throughput								
1,000.0 M gal													
TAC/ODC TO	TAC/ODC Toxic Pollutants / Ozone Depleting Compounds												
TAC Group	TAC Group 2 - Benzene												
CAS # (Pollu	itant)	7143	32 - Benzen	е									
Emission Fa	Emission Factor (EF) 5.54000e-3 * lbs/M gal												
			Controlled E (mark checkb	F value	isted represents EF determined after control)								
Overall Cont	trol Efficiency												
Emission Fa	ctor Comment	Bez	ene is 1% o	of Total \	/OC Emissions								
Emission Fa	ctor Data Source	Bac	k-calculatio	n	*								
Emissions		5.54	0e+0 lbs										
					Click here to <u>delete</u> this Emission	I.							
					Save Cancel								

CASE 3 - OPERATIONS EQUIPPED WITH A VAPOR BALANCE AND DESTRUCTION SYSTEM

Over the year, company RST operates a loading terminal with submerged bottom filling 125,000,000 gallons of gasoline RVP 10 into tanker trucks that have passed the MACT level leak test at the same conditions as Case 2. The vapor vent line is connected to a system of vapor balance and then to an afterburner (thermal oxidizer -TO). The system of vapor balance achieves an overall efficiency of 49%. The oxidizer operates at 99.4% destruction efficiency.

 L_L = 9.62 *lb VOC/Mgal* (see Case 2 studies for loading loss factor calculation)

Q = 125,000 Mgals

 $Eff_{VC} = 0.992$ (Vapor Collection Efficiency)

 $Eff_{VB} = 0.49$ (Vapor Balance Efficiency)

 $Eff_{VD} = 0.994$ (Vapor Destruction Efficiency)

Equation 4 yields the VOC emissions as follows:

 $E_3 = 125,000 Mgals * 9.62 \frac{lbs VOC}{Mgal} * \left[1 - 0.992 * \left(0.49 + 0.994 - (0.49 * 0.994)\right)\right] = 13,276 lbs VOC$

COMBUSTION EMISSIONS FROM THERMAL OXIDIZER (TO)

All thermal oxidizers used at bulk loading facilities are required to have a CARB Certification Test. In some cases, NOx, SOx, CO, and PM emission rates are tested and determined in terms of lbs of pollutant/Mgal material loaded. AQMD encourages operator to use the test results in calculating and reporting emissions.

In this example, other contaminants were not tested for the TO. Emissions for other air contaminants are calculated using the best available default factors published in AER Program Help & Support. Throughput for the TO is determined using Equation 5 as follows for gasoline RVP 10 with liquid density of 5.6 lbs/gallon:

 $TO_{Throughput} = \frac{125,000 * 9.62 * 0.992}{1,000 * 5.6} * (1 - 0.49) = 108.64 Mgals of gasoline$

Edit Emission Process - Other Processes											×
AEI	R Device ID	P De	Permit vice ID	A/N	Process ID	Rule #		Activi	ity		
	ES37				P1	462	Petroleum : Bulk Plants and MarineTerminals : Loa Tank Trucks : Gasoline				
	AER Devic	e ID		ES37	AER De	vice Nan	ne				
	NON-PERM	ЛТТЕ	D		Permit [Device ID)				
	Process ID			P1	Process	Name		Bulk Loading			
	Process Co	ommei	nt	Case 3 - Vapor Balance and Destruction System							
	Activity Co	de *	Sector:								
			Petrole	um						•	
			Industry:								
			Bulk Pla	ants an	id MarineTe	erminals	i			•	
			Operatio	n:							
			Loading) - Tan	k Trucks					-	
			Process:								
			Gasolin	е						•	
	Rule # 462 Add Rule										
									Save	Cancel	

Edit Throughput Information - Other Processes										
AER Device ID	AER Device Permit Device A/			Rule #	Activity					
ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading - Tank Trucks : Gasoline					
				Ann	ual Throughput					
					1,000.0 M gal					
Annual Thro	ughput		125000		* M gal *					
Throughput	Туре		Input 💌	*						
Throughput	Comment									
					Save Cancel					

Open Criter	ia Emission Info	ormati	on - Other	Proces	sses ×						
AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity						
ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading - Tank Trucks : Gasoline						
				Ann	ual Throughput						
125,000.0 M gal											
Pollutant		VOC	- Volatile C)rganic	Compounds						
Emission Fa	Emission Factor (EF) 9.6200 * Ibs/M gal										
	Controlled EF value (mark checkbox if EF listed represents EF determined after control)										
Overall Cont	trol Efficiency	0.98	896								
Emission Fa	ctor Comment	Vap and	or Collection the Destruc	n is 99.2 tion Eff	2% Effective, Vapor Balance Efficiency is 49.0%, iciciency is 99.4%						
Emission Fa	ctor Data Source	Sou	irce Test		*						
Emissions		13,2	75.60 lbs								
					Click here to <u>delete</u> this Emission.						
					Save Cancel						

Open Criteria Emission Information - External Combustion *												
AER Device ID	Permit	Device ID	vice ID A/N Process ID Rule # Eq		Equipment	Fuel						
ES37				P2	480	Other process equipment	Gasoline					
Annual Thre	oughput			Criteria/Toxic Thi	roughput	GHG Throug	hput					
108.64 N	vi gal			108.64 M g	jal	108,640.0 (gal					
Throughput used to calculate emissions: 108.64M gal												
Pollutant	Pollutant VOC - Volatile Organic Compounds											
Emission Factor (Ef	F)	0.00		* Ibs/M	l gal							
Emission Factor Co	omment	Emissions	Already	Included in Pro	cess ID P1	×						
Emission Factor Da	ta Source	Other					*					
Emissions		0.00 lbs										
						Save	Cancel					

(Open Toxic	(TAC/ODC) Emi	issior	n Informatio	on - Oth	ner Processes	×				
А	ER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity					
	ES37			P1	462	Petroleum : Bulk Plants and MarineTerminals : Loading - Tank Trucks : Gasoline					
					Ann	ual Throughput					
					10	25,000.0 M gal					
	TAC/ODC T	oxic Pollutants / Ozo	one De	pleting Comp	ounds						
	TAC Group		2 - E	Benzene							
	CAS # (Pollu	itant)	71432 - Benzene								
	Emission Fa	ctor (EF)	1.06200e-3 * lbs/M gal								
			Controlled EF value (mark checkbox if EF listed represents EF determined after control)								
	Overall Cont	rol Efficiency									
	Emission Fa	ctor Comment	Bezene is 1% of Total VOC Emissions								
	Emission Fa	ctor Data Source	Bac	ck-calculatio	n	*					
	Emissions		1.32	8e+2 lbs							
						Click here to <u>delete</u> this Emission.					
						Save Cancel					

Edit Emission Process	s - Extern	nal Combustion				×
AER Device ID Permit D	evice ID	A/N Process ID	Rule #	Equipment		Fuel
ES39		P1	480	Afterburner 10-100 MI	MBTU/HR	Natural Gas
AER Device ID	ES39	AER Device Name				
NON-PERMITTED		Permit Device ID				
Process ID	P1	Process Name	Loading Rack Afterbur	ner		
Process Comment						
Fuel Natural G	as	*				
Rule # 480		 * Add Rule 				
Equipment Afterburn	er 10-100) MMBTU/HR				-
				S	ave	Cancel

Edit Throughpu	t Information - Exter	nal Co	mbustion			×
AER Device ID	Permit Device ID	A/N	Process ID	quipment	Fuel	
ES39			P1	10-100 MMBTU/HR	Natural Gas	
Annual Ti	hroughput		ughput			
Fuel Usage (Ann Throughput Type Fuel Usage Com	ual Throughput) e ment	4	l.2 Input ▼ *	* mmscf	Y *	
					Save	Cancel

Report Criteria and toxic compounds using default factors as below:

Criter	ria Emissions	s (lbs)				
	Pollutant	EF	Unit	EF Data Source	Overall CE	Emissions
<u>Open</u>	VOC	7.00	lbs / mmscf	AQMD default		29.40
<u>Open</u>	NOx	130.00	lbs / mmscf	AQMD default		546.00
Open	SOx	0.60	lbs / mmscf	AQMD default		2.52
Open	CO	35.00	lbs / mmscf	AQMD default		147.00
<u>Open</u>	PM	7.50	lbs / mmscf	AQMD default		31.50

Toxic (TAC/ODC) Emissions (lbs)

	TAC/ODC Group	CAS #	EF	Unit	EF Data Source	Overall CE	Emissions
<u>Open</u>	Benzene	71432	5.80000e-3	lbs / mmscf	AQMD default		2.436e-2
<u>Open</u>	Formaldehyde	50000	1.23000e-2	lbs / mmscf	AQMD default		5.166e-2
<u>Open</u>	PAHs [PAH, POM]	1151	1.00000e-4	lbs / mmscf	AQMD default		4.200e-4
<u>Open</u>	PAHs [PAH, POM]	91203	3.00000e-4	lbs / mmscf	AQMD default		1.260e-3
<u>Open</u>	Acetaldehyde	75070	3.10000e-3	lbs / mmscf	AQMD default		1.302e-2
<u>Open</u>	Acrolein	107028	2.70000e-3	lbs / mmscf	AQMD default		1.134e-2
<u>Open</u>	Ammonia	7664417	1.80000e+1	lbs / mmscf	AQMD default		7.560e+1
<u>Open</u>	Ethyl benzene	100414	6.90000e-3	lbs / mmscf	AQMD default		2.898e-2
<u>Open</u>	Hexane	110543	4.60000e-3	lbs / mmscf	AQMD default		1.932e-2
<u>Open</u>	Toluene	108883	2.65000e-2	lbs / mmscf	AQMD default		1.113e-1
<u>Open</u>	Xylenes	1330207	1.97000e-2	lbs / mmscf	AQMD default		8.274e-2
Add	New						

Edit Emission Proc	ess - Extern	al Comb	oustion			×
AER Device ID Pe	rmit Device II	A/N	Process ID	Rule #	Equipment	Fuel
ES37			P2	480	Other process equipment	Gasoline
AER Device ID	ES37	AER De	evice Name			
NON-PERMITTED		Permit (Device ID			
Process ID	P2	Process	s Name	Loading	Rack Afterburner	
Process Comment	Emission	ns from B	Burning Gasolir	ne Vapor		
Fuel Gasoli	ne	*				
Rule # 480	-	* <u>Add I</u>	Rule			
Equipment Other	process equi	pment			-	
					Save	Cancel

Edit Th	roughput l	nformation - Externa	l Comb	ustion			×
AER De	vice ID	Permit Device ID	A/N	A/N Process ID Rule # Eq			Fuel
ES	37			P2	480	Other process equipm	nent Gasoline
	Annual Throughput			Criteria/Toxic Th	roughput	GHG	Throughput
	108.64 M gal			108.64 M g	gal	10	18,640.0 gal
Fuel Us Throug	Fuel Usage (Annual Throughput) Throughput Type		108. Inpu	64 .t 💌 *	* M	l gal 💌 *	
Fuel Us	age Comme	nt					
						Sav	ve Cancel

Open Criteria Emis	sion Info	rmation - Ex	ternal	Combustion			×			
AER Device ID	Permit	Device ID	A/N	Process ID	Rule #	Equipment	Fuel			
ES37				P2	480	Other process equipment	Gasoline			
Annual Throu	lghput			GHG Throug	hput					
108.64 M	gal		108.64 M gal 108,64							
Throughput used to calculate emissions: 108.64M gal										
Pollutant		VOC - Volatile Organic Compounds								
Emission Factor (EF)		0.00		* lbs/M	gal					
Emission Factor Com	iment	Emissions Already Included in Process ID P1								
] *			
Emission Factor Data	Source	Other	Other							
Emissions		0.00 lbs								
						Save	Cancel			

Open Criteria Emi	ission Info	rmation - Ex	ternal	Combustion			×	
AER Device ID	Permit	Device ID	A/N	Process ID	Rule #	Equipment	Fuel	
ES37				P2	480	Other process equipment	Gasoline	
Annual Thre	Annual Throughput			Criteria/Toxic Thr	oughput	GHG Throughput		
108.64 N	108.64 M gal			108.64 M g	108,640).0 gal		
Throughput used to	calculate e	missions: 108.6	4M gal					
Pollutant		NOx - Nitrog	jen Oxi	des				
Emission Factor (EF) 22.87				* Ibs/M	gal			
		RECLA	М					
Emission Factor Co	mment						▲ ▼	
Emission Factor Da	ta Source	Source Tes	st				*	
Emissions		2,484.60 lbs	;					
						Save	Cancel	

ER Device ID Per	mit Device ID	vice ID A/N Process ID Rule # Equir			Equipment	Fuel			
ES37		P2 480 Other process equ				Gasoline			
Annual Throughpu	t		Criteria/Toxic Th	roughput	GHG Throug	hput			
108.64 M gal		108.64 M gal 108,64							
Throughput used to calcula	te emissions: 108	.64M gal							
Pollutant	SOx - Sulf	SOx - Sulfur Oxides							
Emission Factor (EF)	0.13		* lbs/N	1 gal					
Emission Factor Comment	SOx Propo	SOx Proportional to Sulfur Content							
Emission Factor Data Sour	e Manufacti	Manufacturer Specification							
Emissions	14.12 lbs								

AER Device ID	Permit	Device ID	A/N	Process ID	Rule #	Equipment	Fue			
ES37				P2	480	Other process equipment	Gasoline			
Annual Thre	oughput			Criteria/Toxic Th	roughput	GHG Throug	ghput			
108.64 N	√l gal			108.64 M g	gal	108,640.0	gal			
Pollutant SOx - Sulfur Oxides										
Emission Factor (El	F)	0.13 * lbs/M gal								
Emission Factor Co	mment	SOx Proporational to Sulfur Content								
Emission Factor Da	ta Source	Manufacturer Specification								
		14.12 lbs								

C)pen Criteria Emis	ssion Info	rmation -	External	Combustion				×		
	AER Device ID	Permit I	Device ID	vice ID A/N Proce		Rule #		Equipment	Fuel		
	ES37				P2	480	Other p	process equipment	Gasoline		
	Annual Thro	ughput			GHG Throug	hput					
	108.64 M	gal	108.64 M gal 108,6					108,640.0	gal		
	Throughput used to calculate emissions: 108.64M gal										
	Pollutant		CO - Cart	oon Mono	oxide						
	Emission Factor (EF)	2.53		* Ibs/N	l gal			_		
	Emission Factor Con	nment						×	1		
	Emission Factor Data	a Source	Source T	est					*		
	Emissions		274.86 lbs	6							
								Save	Cancel		

AEP Device ID	Permit	Device ID	A/M	Process ID	Pule #	Equipment	Fuel	
EC97	rennu	Device ID	A/N	PIOCESSID	490	Other process equipment	Casoline	
Appual Throughput				F∠ Criteria/Toxic Th	400	GHG Thro	Gasoline	
108.64 M gal		108.64 M gal		108,640	108,640.0 gal			
Throughput used to	calculate er	nissions: 108.	64M gal					
Pollutant		PM - Particulate Matter						
Emission Factor (EF)		1.14 * lbs/M gal						
Emission Factor Comment Assumed the average point between light fuel (propane) and h (diesel), using Appendix A default factors from AP-42)					propane) and heavy fuel AP-42)	▲ ▼		
Emission Factor Data Source		Other *						
Emissions		123.85 lbs						

Facilities must report toxic emission as well for this process. If default emission factors are needed, use the following, in pounds/1000 gallons of equivalent gasoline burned.

POLLUTANT	CAS NO.	EMISSION FACTOR	
Benzene	71432	3.8061	
1,3-Butadiene	106990	0.9183	
Formaldehyde	50000	3.4520	
Nickel	7440020	0.0033	
Naphthalene	91203	0.1438	

Note that facilities that are subject to AB2588 Quadrennial reporting requirements must report emissions for toxic species listed in Table B-4 of the <u>Supplemental Instructions for AB2588</u> Facilities – December 2016, and select the default emission factors for Non-catalyst Internal Combustion Engine types.