Guidelines for Reporting Refinery Flare Emissions



Revised December 2022

The South Coast Air Quality Management District (SCAQMD) Rule 301 (e) requires facilities operating under SCAQMD permit to annually report their emissions from all equipment (permitted and non-permitted) as part of SCAQMD's Annual Emissions Reporting (AER) Program. The following are specific instructions for reporting emissions from flares.

SPECIFIC INSTRUCTIONS

This guideline is intended only for flares subject to SCAQMD Rule 1118 operating at petroleum refineries. As such, for AER purpose, petroleum refinery flare emissions shall be reported in the manner specified below. For flares operating at other facilities, such as hydrogen plants, landfills, etc., emissions should be reported as for external combustion equipment. The following are instructions on how to report criteria polllutant and toxic emissions from petroleum refinery flares using the AER tool.

There are three different sets of formula for the calculations of the criteria pollutant emissions for VENT GAS, NATURAL GAS and PROPANE AND BUTANE GAS on ATTACHMENT B of the RULE 1118 (July 7, 2017).

The AER Tool is designed for back calculation of refinery's annual crude oil processed in thousand barrels and the calculated annual criteria pollutants emissions (lbs/year).

The facility must calculate the annual emissions of the criteria pollutant emissions in accordance with the formula in ATTACHMENT B of RULE 1118 (July 7, 2017), and input the calculated annual emissions into the AER Reporting Tool. The emission factors can be back-calculated from the refinery's annual crude oil processed (thousand barrels) and the annual criteria pollutant emissions.

For this example, let's assume that facility ABC, ID 999001, is a petroleum refinery equipped with an emergency flare, F1, application number (A/N) 123456, Permit to Operate (P/O) G65432, is reporting emissions for the date year (DY) 2022 and is designated as Device ID ES61.

If you used the <u>Import from Last Year</u> function, or if the permitted flare was uploading by South Coast AQMD staff, the ES Device ID should appear in the table with green headers and you can jump to Step 5 of this document. If the flare is not already in your profile and you would like to add it, you may start with Step 1.

1. If you are adding a new ES click on the orange "Add New Emission Source" button seen below.

Facility ID: 999001	Build	l Repo	rtin	g Str	uctu	ire							
1. Facility Information 2. Status Update	Emissi	on Sour	ces (I	ES) Cla	assific	ation							
Combustion Fuels Lenission Sources (ES) Seport Process/Emissions Additional Toxic Substances Production and Usage Perform Data Validation Review Summaries Print Facility Report	Sum	mary: ruction:	This devic adde Add devic emis tank	sectio ce has d. Device ces by sion d data l	n con a spe es (em clicki ata by by clic	tains facility p cified Emissio issions source ng "Profile" ur / clicking "Ope cking on link "(bermit n Sour s) by ider the n" und Click h	: profile. P rce (ES). N clicking "A he Emissio der the En here" belov	dd Ne dd Ne n Sou nissio w.	e make su mission s ew Emiss irce (ES) ns colum	ire that ources ion Sour Column n. Uplos	every can also rce". Edit . Add ad storag	oe e
10. Report Submission	Storag Add	ge Tank Er <mark>New Emi</mark>	nissior ssion	ns Batcl Source	h File I	mport - <u>Click he</u>	re for r	more instruc	tions.				
	Displ	aying 29	emissi	ion sou	rces. \	′ou can search t	oy:						
	A/N						Permit	NO					
	AER D	evice ID					Permit	Device ID					
	Sear	ch Emissi	on Sou	irces									
							9	Search:				Print Pre	view
	Emission Source (ES)	Emissions	A/N	Permit NO	Permit Device ID	Permit Equipment Description	AER Device ID	ES Name	ES Group Name	Source Category	Has Emissions	Equipment	PERP
	Profile	<u>Open</u>					ES60	ICE No 2		Internal Combustion	Y	Stationary I.C. Engines, 4 Stroke- Lean Burn, with Catalyst	N

2. Click on the "Permitted" check box and add the Application Number by clicking on the drop-down menu and choosing the "Add New" option. Add the "Permit No" and "ES Name." For this example, we will select the "Normal Operation" option from the "Operating ES Status" drop-down menu. The orange "Categorize Emission Source" button will appear.

Facility ID: 999001 1. Facility Information	Edit Emission Source	
2. Status Update 3. Combustion Fuels 4. Emission Sources (ES) 5. Report Process/Emissions 6. Additional Toxic Substances Production and	Instruction: Add new er specificatic best reflect Red Asteris populated,	nissions sources using information found on permits, manufacturers ns, or identifying placards. Select the Operating ES Status that : the device's operation for this reporting period. All areas with a (') must be addressed. Note: Some devices have been pre- verify that the information is correct
Usage		
7. Perform Data Validation	Permitted	
9 Print Facility Report	A/N	123456 Add New ~
10. Report Submission	PERP Equipment(CARB's Portable Equipment Registration Program)	Only CARB GHG MRR and Over 250 tons/yr (PTE) facilities must report PERP Emissions are not included when calculating emission fees
	Permit No	G65432
	Permit Device ID	
	AER Device ID	will be assigned upon saving
	ES Name	Emergency Flare El
	Operating ES Status	Normal Operation
	Comment	
	Emission Source Category	Categorize Emission Source
	Design Capacity	0
	Save or Save and retu Save and proceed to Proce Optional: Save and Mark a	rn to List of Emission Sources or ss Reporting or <u>Cancel</u>

3. Click on the orange "Categorize Emission Source" button. The pop-up shown below will appear. Click on the <u>click here</u> in Option 7 Other Processes. Click on the "Other process equipment" check box that appears. Click on the orange "Save" button. This facility already has 60 emission sources, therefore the new ES we just added was assigned as Device ID ES61.

Categorize	Categorize Emission Source												
Permitted	A/N	Permit No	Permit Device ID	Permit Equipment Description	AER Device ID	ES Name							
Yes	123456	G65432			ES61	Emergency Flare FI							
 Externa followir Interna followir Spray (Other U followir 	 External Combustion Equipment (e.g., boiler, dryer, oven, furnace, heater, afterburner, flare, kiln or incinerator) <u>click here</u> to select one the following Equipment: Internal Combustion Equipment (e.g., internal combustion engine (excluding vehicles), turbine or micro turbine) <u>click here</u> to select one of the following Equipment: Spray Coating/Spray Booth (e.g., coatings, solvents, adhesives, etc.) <u>click here</u> to select one of the following Equipment: Other Use of Organics (e.g., coatings, solvents, inks, adhesives, etc.) except in Spray Coating/Spray Booth, <u>click here</u> to select one of the following Equipment: 												
5. Liquid s	Storage Tar	nk (e.g. Undergr	ound, Aboveground, Sma	ll Tanks, Dispensing Systems) <u>click here</u> to	select one of the foll	owing Equipment:							
6. Fugitiv	e Compone	nts (Emission Le	aks from Process Compo	nents per Rule 462, 1173 and 1176), <u>click</u>	here to select all app	licable Equipment:							
7. Other F 7. Other F	7. Other Processes (does not fit in any of the groups mentioned above), click <u>click here</u> to mark "Other Process Equipment": Other process equipment												
						Save Cancel							

4. Now that you have added all the emission source information for the Flare, you can click on the orange "Save and return to List of Emission Sources" button.

Facility ID: 999001	Form data is successfully s	aved.							
1. Facility Information 2. Status Update 3. Combustion Fuels	Edit Emission Source								
4. Emission Sources (ES) 5. Report Process/Emissions 6. Additional Toxic Substances Production and Usage 7. Perform Data Validation 8. Review Summaries	Instruction: Add new emissions sources using information found on permits, manufacturers specifications, or identifying placards. Select the Operating ES Status that best reflect the device's operation for this reporting period. All areas with a Red Asterisk (*) must be addressed. Note: Some devices have been pre-populated, verify that the information is correct								
9. Print Facility Report									
To. Report Submission	Permitted	400.458							
	PERP Equipment(CARB's Portable Equipment Registration Program)	Only CARB GHG MRR and Over 250 tons/yr (PTE) facilities must report PERP Emissions are not included when calculating emission fees							
	Dormit No.	G65422							
	Permit No Permit Device ID Permit Equipment Description	009432							
	AER Device ID	ES61							
	ES Name	Emergency Flare FI *							
	Operating ES Status	Normal Operation 🗸 *							
	Comment								
	Emission Source Category	Other Processes Categorize Emission Source *							
	Equipment	Other process equipment							
	Design Capacity	0.000000							
	Save or Save and retu	rn to List of Emission Sources or							
	Optional: Save and Mark as	s Completed Click here to <u>delete</u> this emission source and associated data.							

5. Click the "Open" link next to the Device ID you want to edit. In this example, the Open next to Device ID ES61.

Facility ID: 999001	Build	Repo	rtin	g Str	uctu	re							
1. Facility Information 2. Status Update	Emissio	n Sour	ces (E	ES) Cla	assific	ation							
 4. Emission Sources (ES) 5. Report Process/Emissions 6. Additional Toxic Substances Production and Usage 7. Perform Data Validation 8. Review Summaries 9. Print Facility Report 10. Report Submission 	Sumn	nary: uction:	This s devic adde Add I devic emiss tank	section te has d. Device tes by sion da data b	n cont a spe s (em clicki ata by cy clic	tains facility p cified Emissio issions source ng "Profile" un clicking "Ope king on link "(oermit n Sour s) by o nder th en" uno Click h	profile. P ice (ES). N clicking "Ad the Emission der the Em there" below	lease ew er dd Ne n Sou issior v.	make su mission s w Emiss rce (ES) ns colum	ire that ources ion Sour Column n. Uploa	every can also I rce". Edit . Add ad storag	e
	Storage Add N	Storage Tank Emissions Batch File Import - <u>Click here</u> for more instructions. Add New Emission Source											
	Displaying 30 emission sources. You can search by:												
	A/N AER De Searc	evice ID h Emissi	on Sou	irces			Permit Permit	NO Device ID					
							S	earch:				Print Pre	view
	Emission Source (ES)	Emissions	A/N	Permit NO	Permit Device ID	Permit Equipment Description	AER Device ID	ES Name	ES Group Name	Source Category	Has Emissions	Equipment	PERP
	Profile	<u>Open</u>	123456	G85432			ES61	Emergency Flare Fl		Other Processes	Y	Other process equipment	N

6. Click the "Open" link under Process ID P1 to report the emissions for flare F1 on the next worksheet:

Proce	ss Refer	ences									×
A/N	Permit No	Permit Device ID	Permit Device Description	AER Device ID	ES Name	ES Group Name	Source Category	Emissions?	Equipment	PERP	ES Status
<u>Open</u>	123456	G65432			ES61	Emergency Flare FI		Other Processes	Y	Other process equipment	N
	P	rocess ID	Source	Group	Proce	ss/Material	/Fuel Name	e	Status	Operation	Туре
	Open	P1	Other Process	s Emissions				We	ork in progress	routin	e
Add	Process	s/Materia	al/Fuel	•							
											DK

7. Start by clicking the "Open" link under the "Step 1: Process" section.

Facility ID: 999001	- « Back	to Emission Sour	ce Proc	ess Referen	ce				
1. Facility Information	Other	Processes							
2. Status Update 3. Combustion Fuels 4. Emission Sources (ES) 5. Report Process/Emissions Combustion External Combustion Internal Combustion	This re which for eve data in under report instruct	porting screen were not cover ery associated en the following external or inte ed here; howev ctions are available	is for r red in p emission s teps steps ernal co ver, it n able by	eporting a revious re n source. I to reset. (ombustion nust be suit clicking o	ctivity da porting so Please sta Combustio process o pstantiate n Help ico	ata for othe creens. Plea art with Ste on emission categories. ed to avoid on in the to	er processes ase provide : ep 1, edits t is need to be Combined e double repo pol bar.	used in your specific info to Step 1 m reported si missions car rting. Detai	r facility rmation ay cause eparately n also be led
Spray Coating/Spray	Step 1:	Process					Opti	onal: Mark as	Completed
Other Use of Organics		AER Device ID		Permit Devi	ce ID	A/N	Process ID	Rule #	Activity
Storage Tanks	(Open)E	561				123456	P1		
Fugitive Components	\smile						Click h	ere to <u>delete</u>	this process.
Process Unset	Step 2:	Throughout							
6. Additional Toxic									
Substances Production and					Annual	Throughput			
Usage	Open								
7. Perform Data Validation	Sec. 2.	Cuito ania Englaci		-)			In Defende De	lada - Francis	Mary Hable
9. Print Facility Report	step s:	Criteria Emissi	ons (ib	»)			Jse <u>peraott en</u>	ission ractors	it available.
10. Report Submission		Pollutant EF	Unit	Controlle	d EF	EF Data So	ource (Verall CE	Emissions
	Add N	lew							
	Step 4:	Toxic (TAC/OD	C) Emis	sions (lbs))				
		TAC/ODC Group	CAS #	EF Unit	Controlle	ed EF EF	Data Source	Overall CE	Emissions
	Add N	lew							

8. Fill out the mandatory fields marked with an asterisk in the pop-up window, then click the "Save" button.

AER Device ID	Permit Device	e ID	A/N	Process ID	Rule #	Activity
51			123456	P1		
AER Device ID PERMITTED	ES61 AN: 123456	AER I	Device Name it Device ID	Emergency F	lare FI	
Process ID	P1 pr		ss Name	Flare		
Process Comment						
Activity Code * Se	ector:	•				
P	etroleum					~
	laustry:					~
0	peration:					•
P	ermitted Sources	5				~
Pr	ocess:					
F	lare					~
Rule #	1118	*				

9. Once finished with "Step 1: Process" continue to "Step 2: Throughput" and click the "Open" link. Enter the total amount of crude oil processed in thousands of barrels (thousand bbl or 1000 bbl) during this reporting period. In this example, let's assume that the amount of crude oil processed by refinery ABC is 100,000 barrels or 100 thousand bbl per day. Therefore, the annual throughput is 36,500 thousand bbl (100 thousand bbl x 365 days/year). Fill out the respective fields, click "Save".

Edit Throug	hput Informatio	n - Othe	er Processe	5	×						
AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity						
ES61		123456	P1	1114	Petroleum : Refineries : Permitted Sources : Flare						
Annual Throughput											
Annual Throug Throughput Tyj Throughput Co	Annual Throughput 36,500.00000000 * 1000 bbl crude processed * Throughput Type Input * Throughput Comment										
					Save Cancel						

10. Click the orange "Add New Button" under "Step 3: Criteria Pollutants" to add new criteria pollutants to your Process page.

Facility ID: 999001	« Ba	ick to Emission	Source Process	Referen	nce							
1. Facility Information	Other Processes											
2. Status Update 3. Combustion Fuels 4. Emission Sources (ES) 5. Report Process/Emissions Combustion External Combustion Internal Combustion	This whice for e data unde repo- instr	reporting so ch were not o every associa a in the follo er external o orted here; h ructions are	reen is for rep covered in pre- ted emission s wing steps to r internal com owever, it mus available by cli	orting a vious re ource. reset. bustion t be su icking o	activity d eporting s Please st Combusti process ibstantiat	ata foi creens art wi on em catego ed to con in t	r other processe 5. Please provide ith Step 1, edit : issions need to pries. Combined avoid double rep the tool bar.	s used in you e specific info to Step 1 m be reported s emissions car porting. Detai	r facility ormation a y cause eparately n also be led			
Spray Coating/Spray	Step	1: Process					Op	tional: Mark as	Completed			
Other Use of Organics		AED Davice ID	Permit Davice ID	A /M	Process ID	Dulo #		Activity				
Storage Tanks	Open	ES61	Permit Device iD	123456	P1	1114	Petroleum : Refiner	es : Permitted So	urces : Flare			
Fugitive Components	Section	2501		120450			Click	here to delete	this process.			
Other Processes								17-00				
Process Upset	Step :	2: Throughp	ut									
6. Additional Toxic Substances Production and Usage	Annual Throughput											
7. Perform Data Validation	open			30,500		OUU DDI	crude processed					
8. Review Summaries	Step	3: Criteria E	missions (lbs)				Use Default 8	mission Factors	if available.			
9. Print Facility Report 10. Report Submission		Pollutant	EF Unit	Controll	ed EF	EF	Data Source	Overall CE	Emissions			
	Ad	d New										
	Step	4: Toxic (TAC	C/ODC) Emissio	ons (lbs	:)							
		TAC/ODC Gr	Dup CAS # E	F Unit	Controll	ed EF	EF Data Source	Overall CE	Emissions			
	Ad	d New										

Per Rule 1118 requirements, refinery ABC calculated the annual criteria pollutant emissions for flare F1 by summing up data from the quarterly emission reports. For reporting individual criteria pollutant emissions in the AER Reporting tool, the emission factors (EF) for each pollutant need to be back calculated, by dividing the individual pollutant annual emissions, in pounds, by the refinery's annual crude oil processed, in thousand barrels.

Let's assume that refinery ABC annual flare VOC emission compiled from the quarterly flare reports is 18,000 lbs. Next, calculate the VOC EF by dividing the VOC emissions (lbs) by the annual crude throughput (thousand bbl):

 $EF_{VOC} = 18,000 \text{ lbs} / 36,500 \text{ thousand bbl} = 0.4932 \text{ lb}/ \text{ thousand bbl}$

(Note: Show your calculation in Emission Factor Comment field in screen below)

11. Once you clicked on the "Open" link underneath "Step 3: Criteria Emissions (lbs)" the below "Open Criteria Emission Information- Other Process" pops-up. For this example, lets add VOC emissions and select it from the drop-down menu for "Pollutant". Add the emission factor (EFvoc) just calculated and a short description to the "Emission Factor Comment" box. Select the "Back-calculation" option as the EF data source, then click "Save".

FR Device ID Permi	t Device ID	A/N	Process ID	Rule #	Activity					
S61	e bevice ib	123456	P1	1114	Petroleum : Refineries : Permitted Sources : Flare					
		120100	Annual Th	roughput						
		36,500.	00000000 100	0 bbl crud	e processed					
Pollutant	VOC	▼ *								
Emission Factor (EF) 4.93200000e-1 * lbs/1000 bbl crude processed										
Controlled EF value (mark checkbox if EF listed represents EF determined after control)										
Overall Control Efficien	cy									
Emission Factor Comm	ent 0.49).4932 lbs./ <u>mbbl</u> = 18,000 lbs./36,500 <u>mbbl</u> .								
If not using AQMD default emission factor please provide detailed references in the Emission Factor Comment box above or upload file with the information. Processes without this information are subject to audit.										
Emission Factor Data S	ource Back	-calculat	tion		✓ *					
Emissions	1.800	18000e	+4 lbs							

12. The next screen will display the VOC emissions calculated by the Tool for flare F1. Similarly, calculate EF for NOx, SOx, CO and PM EF and report the flare criteria pollutant emissions by clicking the "Add new" button in Step 3. Finally, go to "Step 4 – Toxics (TAC and ODC) Emissions (lbs)", click "Add new" and report all TAC emissions for the flare by using similar methodology to what was used for criteria pollutant emissions.

Facility ID: 999001

1. Facility Information

- 2. Status Update
- 3. Combustion Fuels
- 4. Emission Sources (ES)
- 5. Report Process/Emissions

Combustion External Combustion Internal Combustion Use of organics Spray Coating/Spray Booth Other Use of Organics Storage Tanks Fugitive Components

Other Processes

Process Upset 6. Additional Toxic Substances Production and

- Usage
- 7. Perform Data Validation
- 8. Review Summaries
- 9. Print Facility Report
- 10. Report Submission

« Back to Emission Source Process Reference

Other Processes

This reporting screen is for reporting activity data for other processes used in your facility which were not covered in previous reporting screens. Please provide specific information for every associated emission source. Please start with Step 1, edits to Step 1 may cause data in the following steps to reset. Combustion emissions need to be reported separately under external or internal combustion process categories. Combined emissions can also be reported here; however, it must be substantiated to avoid double reporting. Detailed instructions are available by clicking on Help icon in the tool bar.

1	Step 1	: Process					Optional: Mark a	
		AER Device ID	Permit Device ID	A/N	Process ID	Rule #	Activity	
	<u>Open</u>	ES61		123456	P1	1114	Petroleum : Refineries : Permitted :	Sources : Flare

Click here to delete this process.

Step 2: Throughput

		Annual Throughput								
<u>Open</u>		36,500.00000000 1000 bbl crude processed								
Step 3: Criteria Emissions (lbs) Use Default								nission Factor	<u>s</u> if available.	
	Pollutant	EF	Unit			Controlle EF	d EF Data Sour	rce Overall CE	Emissions	
<u>Open</u>	VOC	4.93200000e- 1	lbs / 1000 bbl crude processed			No	Back- calculation		1.80018000e+4	
Add New										
Step 4: Toxic (TAC/ODC) Emissions (lbs)										
	TAC/O	TAC/ODC Group CA		EF Unit	Controlle	d EF E	EF Data Source	Overall CE	Emissions	
Add New										