Guidelines for Calculating Emissions from Dairy and Poultry Operations

(Revised December 2022)

The dairy and poultry farms are required to report to the SCAQMD their emissions of Volatile Organic Compounds (VOC), Particulate Matter (PM) and Ammonia (NH_3) that result from the handling of livestock waste. For poultry operations, there are additional PM emissions from bird feed.

1. PROCEDURES

Facilities can estimate their VOC, PM, and NH_3 emissions using the equation:

$$E = Q * EF * (1 – CE)$$

Where,

E = VOC, PM or NH_3 emissions, expressed in pounds per year (lbs/yr)

Q = Throughput is the number of animals per reporting year by animal category. For poultry farms, the throughput is also expressed in tons of bird feed when estimating PM emissions from bird feed.

EF = Uncontrolled emission factors from Table 1 based on the animal categories and materials.

CE = Control effectiveness listed in Table 2 based on the types of manure disposal practices.

Table 1: Uncontrolled Emission Factors[a]

Animals/Operations	VOC lbs/head	PM		NH_3 lbs/head
		lbs/head	lbs/ton	
Dairy Farms:				
Milking Cows	12.8	3.56	---	74.0
Dry Cows	8.7	3.56	---	45.4
Heifers (4-24 months)	6.1	3.56	---	27.8
Heifers (4-24 months)[b]	4.4	3.56	---	27.8
Calf (under 3 months)	4.5	3.56	---	23.6
Mature Cows[b]	6.3	3.56	---	74.0
Poultry Farms:				
Birds Manure	0.02565	0.0308		0.192
Birds Feed	---	---	0.108	---
Swine Farms:				
Swine	4.64	---	---	20.3

a. The emission factors from Table 1 are from the Governing Board Meeting Agenda, October 7, 2011, Appendix I

b. Emission factors for dairy operations with flush lanes that are flushed with water to a holding pond.

c. Milking cow is a cow raised to produce milk

d. Dry cow is a cow of approximately 2 weeks from calving and in between lactation, hence, is not giving milk and is usually kept separately for different feeding
e. Heifer is a young female calf under 3 years old and has not borne a calf
f. Calf is a young cow or bull in its first year
g. Mature cow is a cow that has had one or two calves and which may be more than 3 years old

Table 2- Control Efficiency[a]

Type of Disposal	(VOC & NH_3) Control Efficiency	(PM) Control Efficiency
No Disposal	---	---
Best Management Practices[c]	---	0.20
Manure Sent out of Basin	0.50	---
Composting (open window)	0.385	---
Composting (enclosed)	0.475	---
Digester (plug & complete mix)	1.0	---
Land Application[d]	0.115	---

a. The emission factors in Table 2 are from SCAQMD Final Staff Report for Proposed Rule 1127 dated August 6, 2004 unless otherwise noted.
b. This emission factor is from SCAQMD Governing Board Meeting Agenda, October 7, 2011.
c. Best Management Practices are Class One Mitigation Measures defined in Rule 223, Appendix A, Table 1, subsections E & F, and Table 2, subsections C & D.
d. Land Application is the use of methods such as tilling, injecting, or plowing that covers animal waste in accordance with NRCS Agricultural Waste Management Field Handbook Chapter 10, Section 651.1102.

2. HOW TO REPORT

VOC, PM, NH_3 emissions must be reported separately for each animal category (i.e., milking cows, dry cows, heifers, birds, etc.). This can be done through the following steps:

1. Determine the annual average number of animals, (Throughput, Q):
   - For a dairy farm, take the annual average number of animals for each annual category from the annual report submitted to the Santa Ana Regional Water Quality Control Board (SARWQCB).
   - For a poultry farm, take the annual average number of birds using your annual recordkeeping report. In addition, the total amount of bird feed used during the same time period is also needed.
2. Select proper emission factors listed in Table 1, (EF):
   - Note that the VOC emission factors are different based on the animal category (e.g., milking cows versus dry cows) and whether the dairy farm has lanes that are flushed with water to a holding pond.
   - Note that the PM emission factors are different based on the source of emissions (bird's manure or feed). There are no VOC or NH_3 emissions associated with bird feed.
3. Select appropriate control efficiency (CE) from Table 2 based on the type of emissions (i.e., VOC, PM, or NH_3) and manure handling method.
4. Enter the information into the AER Reporting Tool.

In the following examples, the blue Navigation Menu on the left-hand side may look different depending on the type of AER you are submitting. The emissions estimation instructions will always be the same regardless of the type of Navigation Menu the reporter sees.

EXAMPLE 1:
Last year, a dairy farm facility has reported to the Santa Ana Regional Water Quality Control Board 900 milking cows, 300 heifers (17-14 months) and no calves. The manure is sent out of the basin. This dairy does not have any lanes that are flushed with water to a pond.

STEPS TO REPORT THE EMISSIONS

Image 1: Click "Emission Sources (ES)" on the Left Navigation Menu. The reporting tool displays existing permitted units (emission sources) as shown at bottom of the image below. If livestock waste handling is not listed, it must be added to the list by clicking "Add New Emission Source." In this example, this farm operations are permitted. Click on the hyperlink "Profile" for Device ID ES58 which will take user to image 2 below.

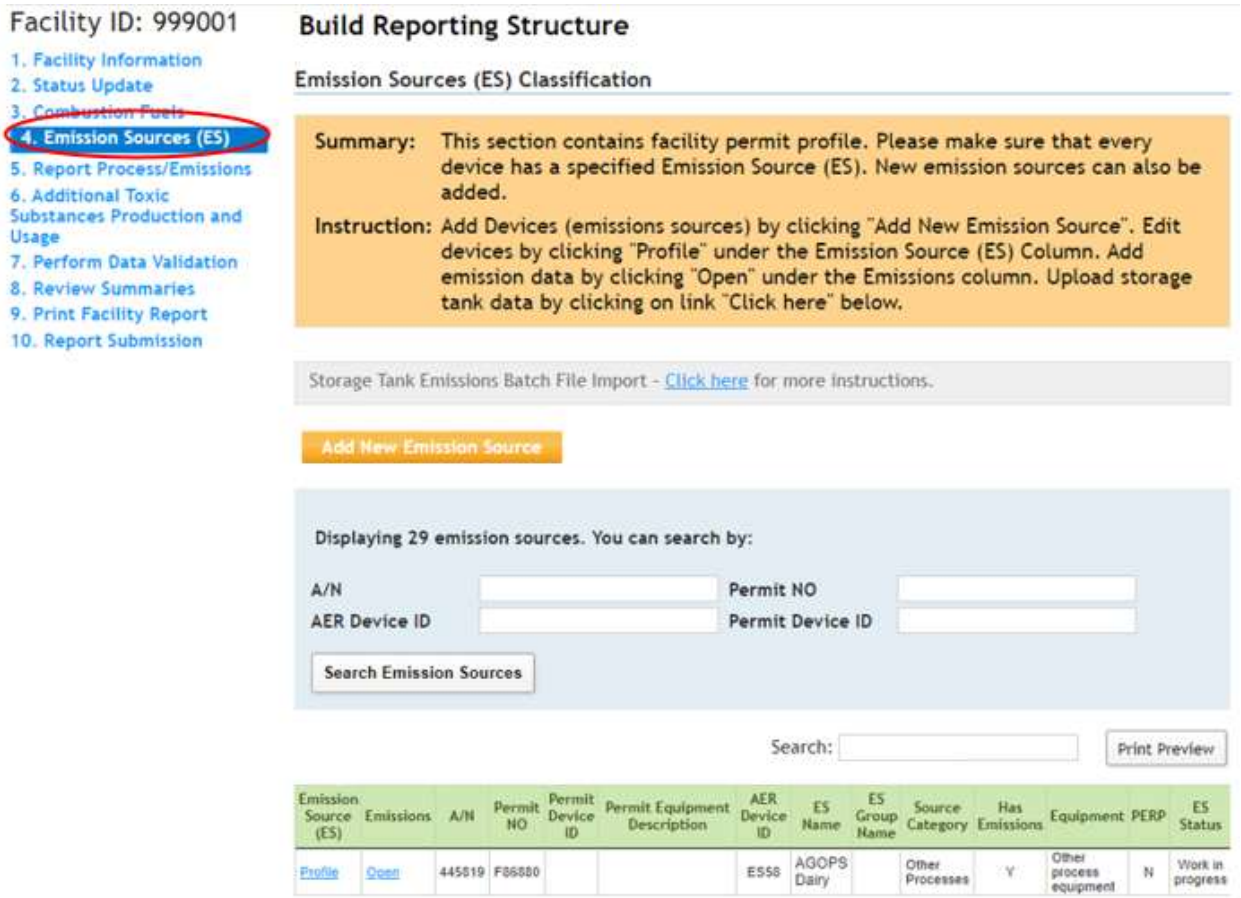


Image 2: Fill out relevant information for the Emission Source by identifying "ES Name" (example, Animal Waste Handling) and selecting the "Operating ES Status" (i.e., Normal Operation) from the drop-down menu. After selecting the appropriate Operating ES Status, the "Categorize Emission Source" button will appear. By clicking this button, the tool will take the user to the next screen (Image 3 below) for categorizing this emission source.

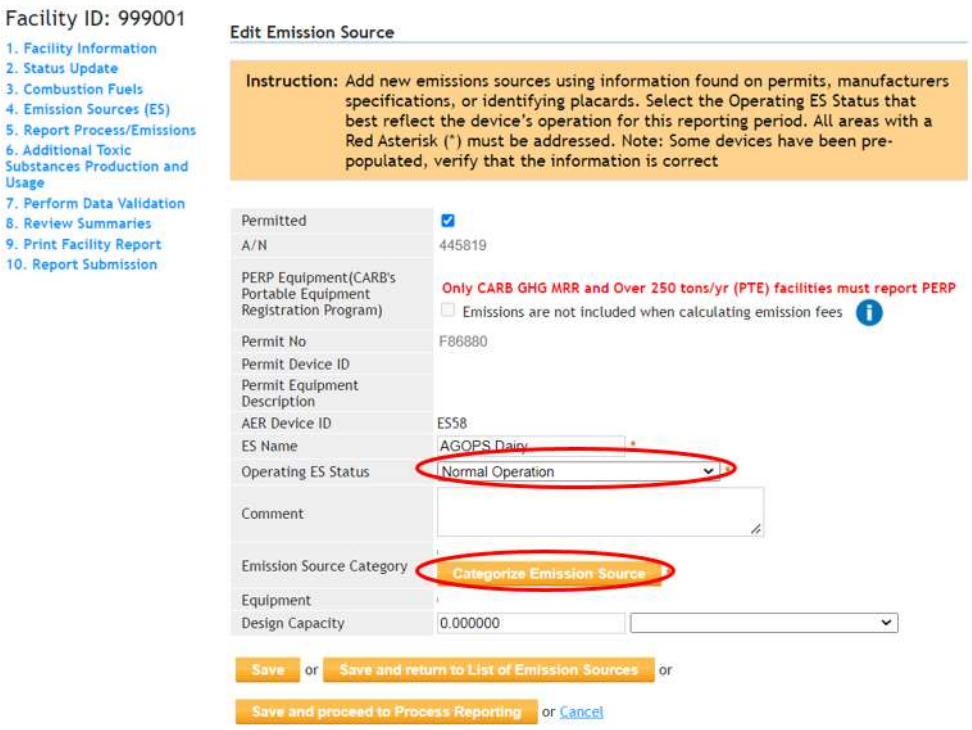
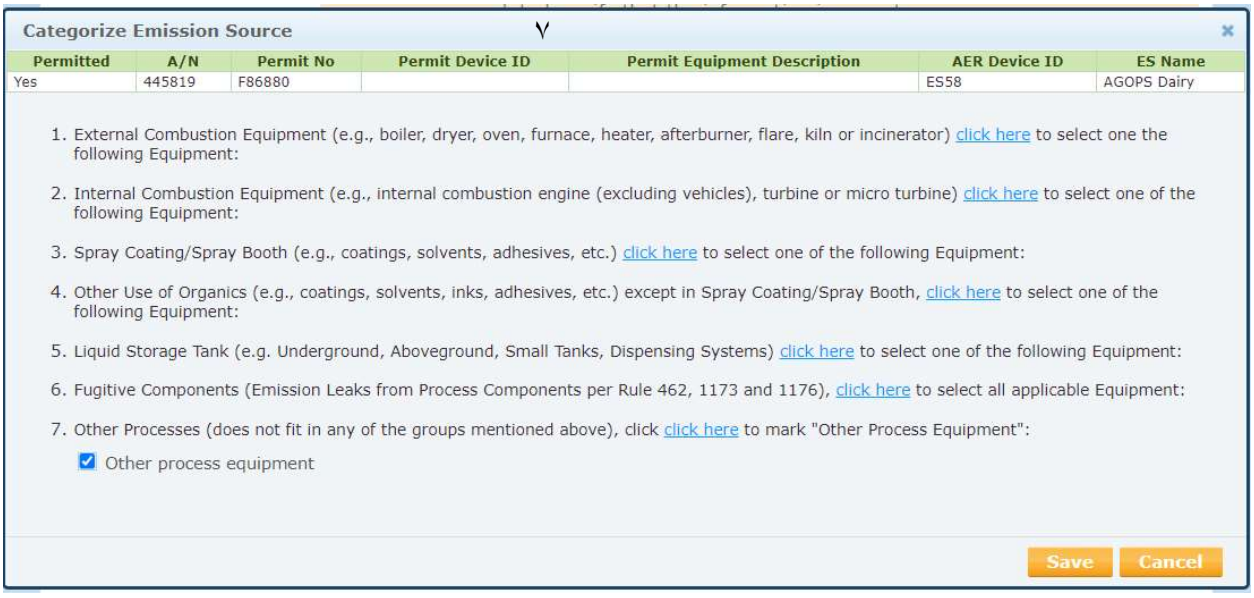


Image 3: In this example, user selects No. 7 Other Processes by clicking on the click here link. Select the check box designated as "Other process equipment," and click the "Save" button.



After saving, the program return user to Image 2. Click "Save and proceed to Process Reporting," which will take the user to the screen shown in Image 4 for reporting emissions for this emission source.

Image 4: The reporting tool adds Process ID (P1) for every Device ID. Click the link "Open" for entering process information such as throughputs, emissions, emission factors, and TACs as shown in Image 5.

Image 5: The below image is the Process page for Device ID 58, Process ID 1. Each step on this page has a designated data entry link or orange button. Click the "Open" link under "Step 1: Process" to enter process information.

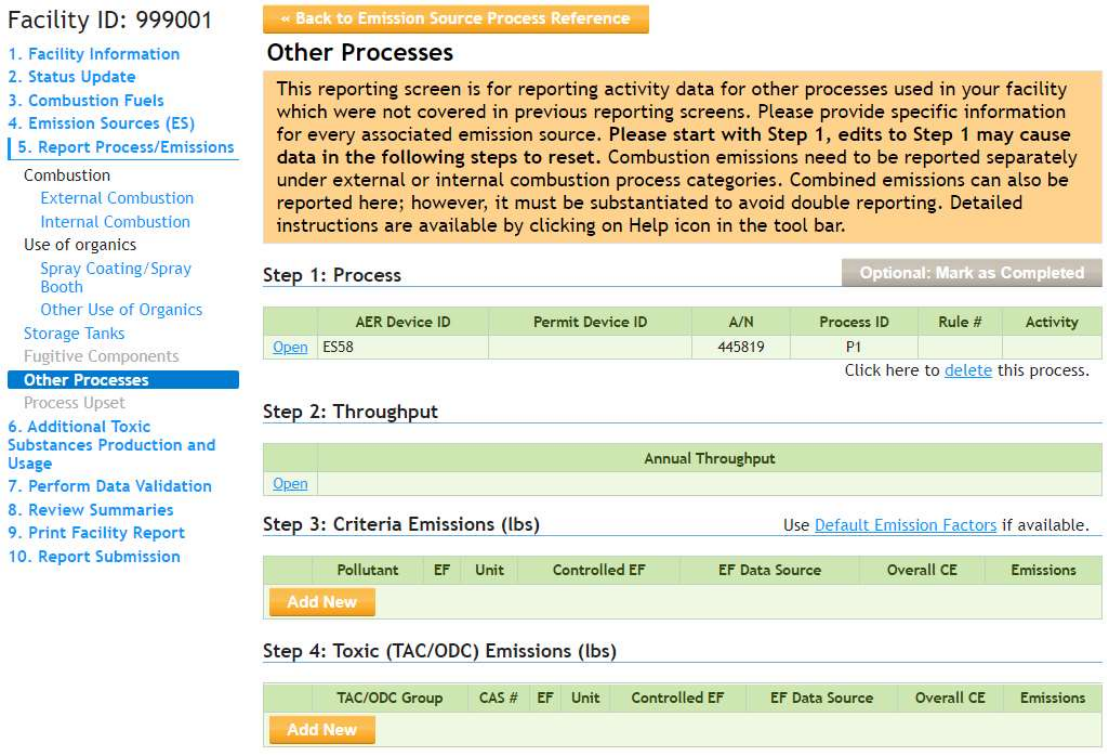


Image 6: The "Edit Emission Process - Other Processes" pop-up appears. Identify the Process Name for the first Process ID P1 and fill out the Activity Code by selecting the appropriate information from the drop-down menu from each box. This example shows correct sector, industry, operation, process, and rule for the milking cows. Click "Save" button.

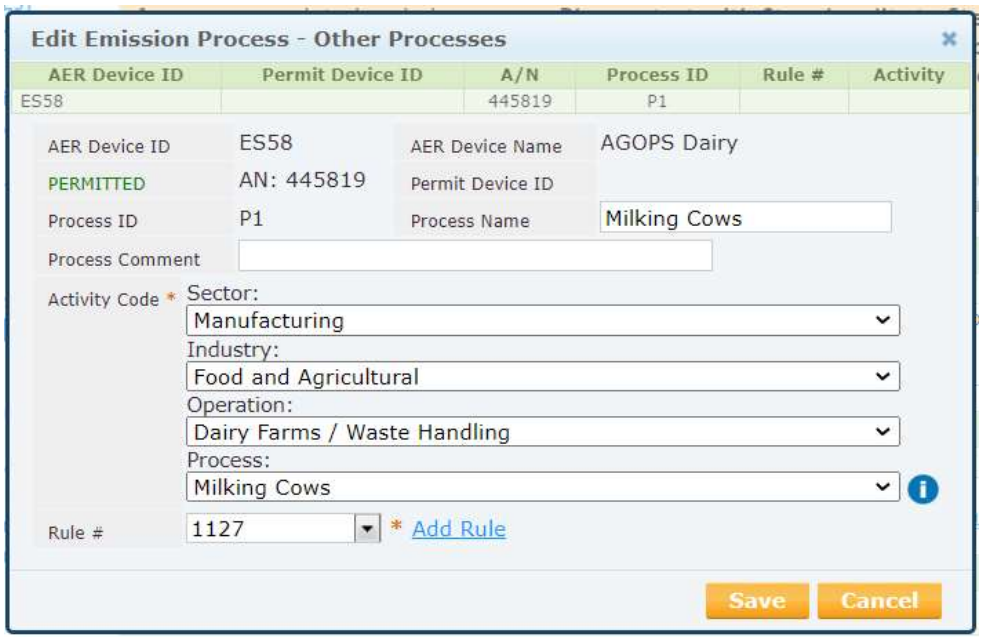


Image 7: After saving, the program alerts the user to the fact that the AER Reporting Tool automatically populates default emission factors. Click the "OK" button.

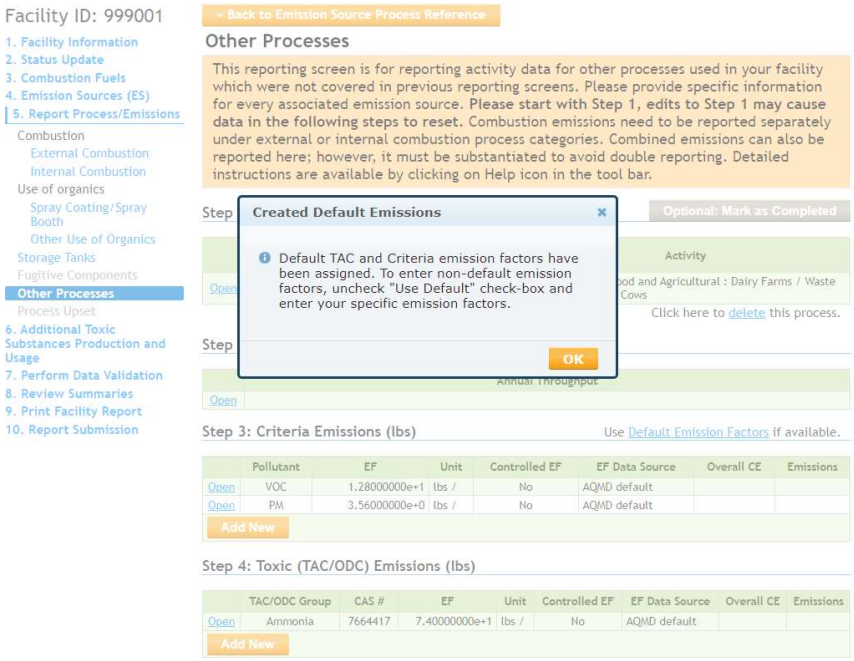


Image 8: After saving, the program returns to Image 5. This time, click on the open link underneath "Step 2: Throughput" (see Image 5) to enter the Annual Throughput, Type and Comment for the Process, as shown below. Click the "Save" button.

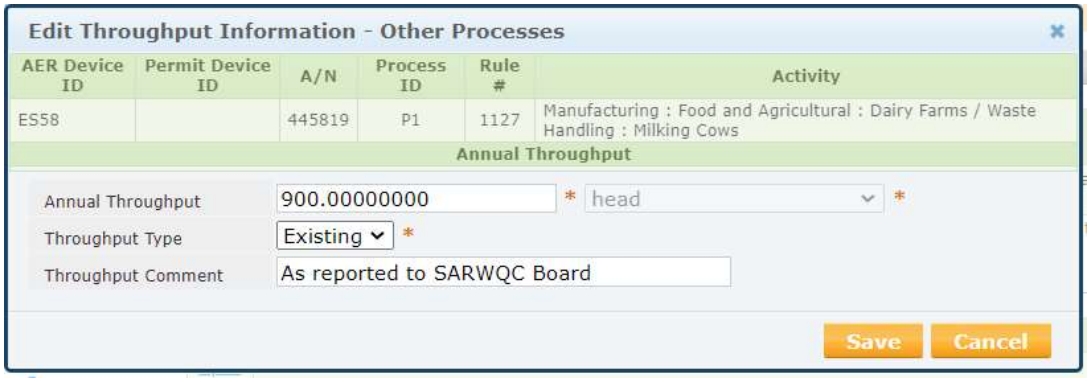


Image 9: After saving, the program returns to Image 5. If you do not need to change the default emission factor or add any new pollutants, you have completed the reporting of Device ID ES58, Process ID P1: Milking Cows. If the user would like to replace the default emission factor with a site-specific emission factor continue to Image 10. If you are eligible for abbreviated reporting under CTR, not using default emission factors will prevent you from submitting an abbreviated report. In other words, only default emission factors are allowed for abbreviated reporting.

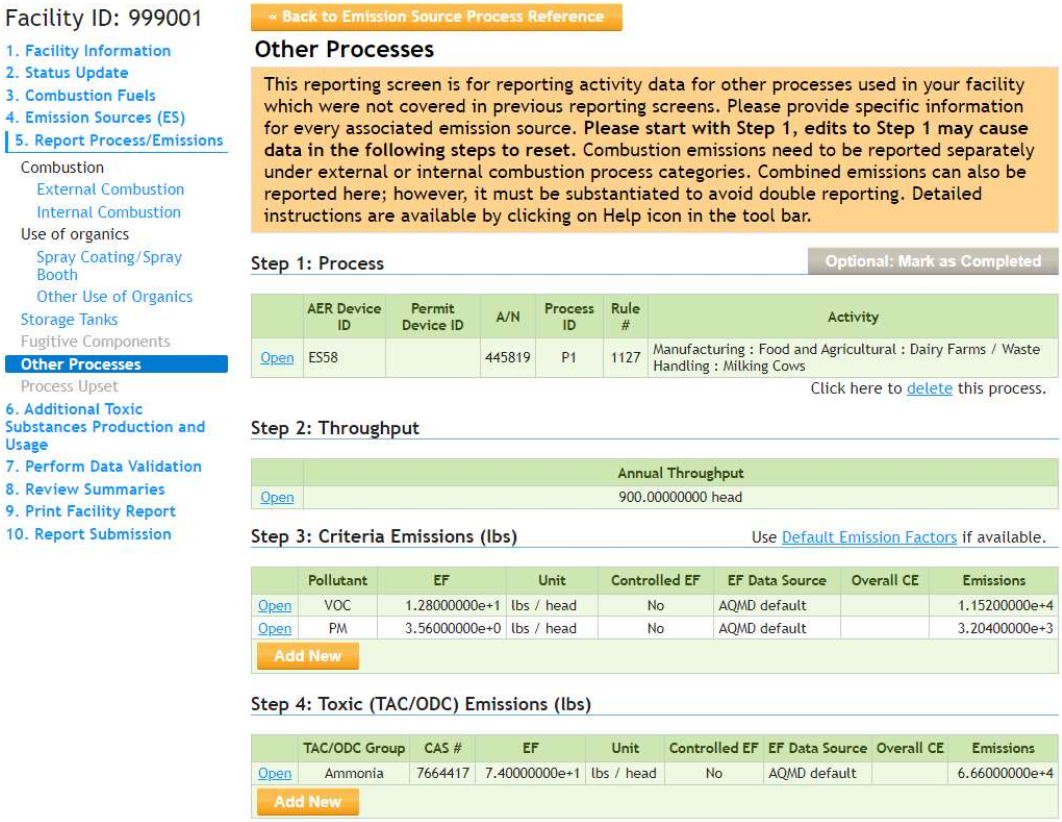


Image 10: Click on the "Open" link next to the pollutant the user would like to change. For the below example let's use VOC.

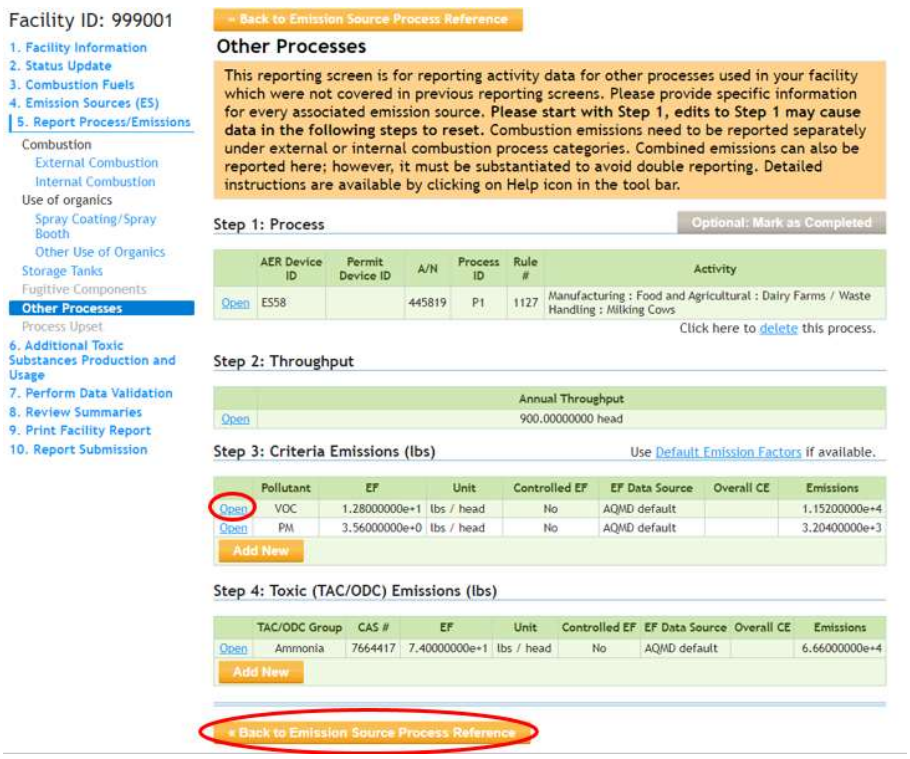
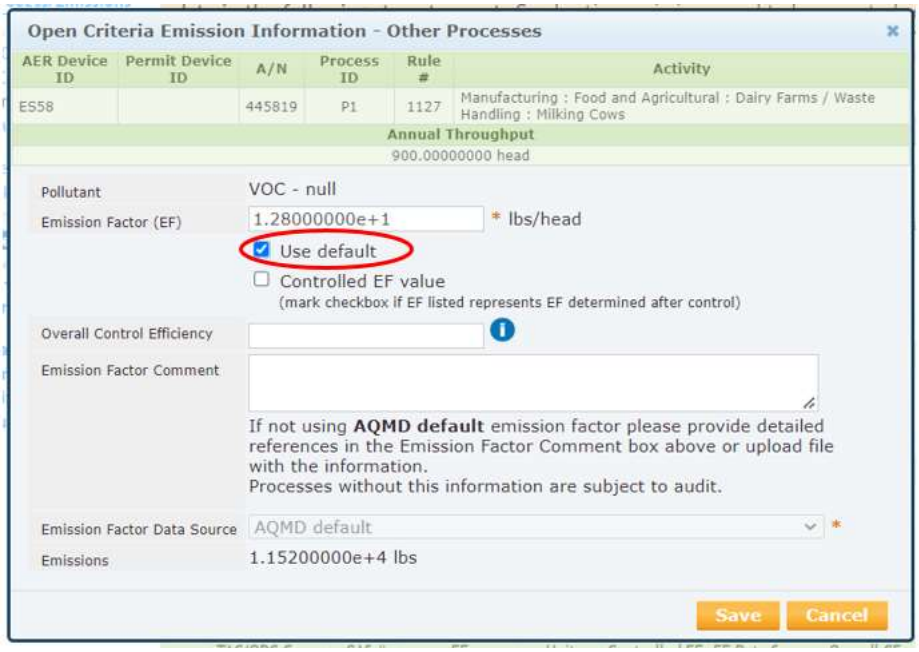


Image 11: Uncheck the check box next to "Use Default". Enter the site-specific emission factor and/or control efficiency. Add detailed information about the development or source of the emission factor and/or control efficiency in the emission factor comment, and select the most appropriate the emission factor data Source for the Process. Click the "Save" button.

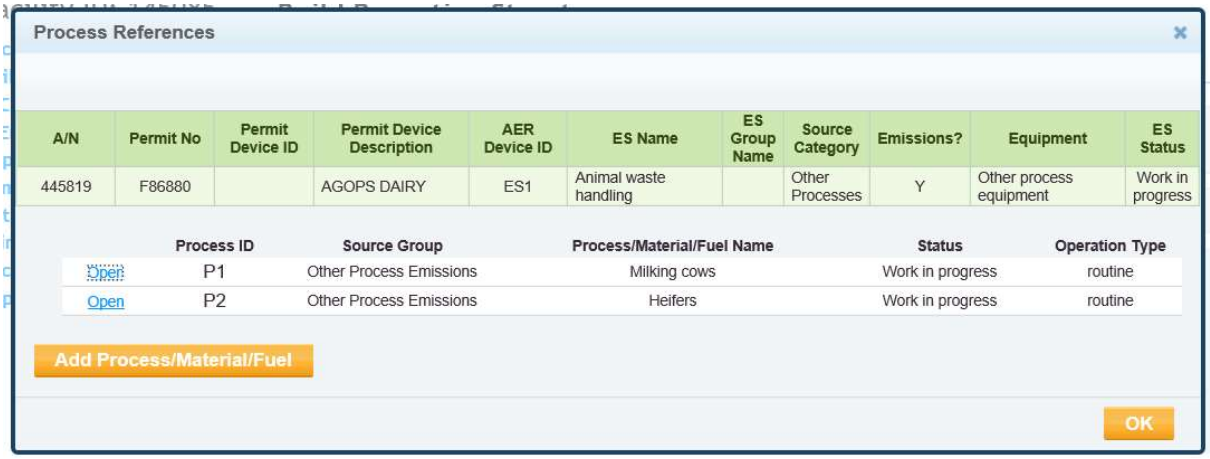


You have now completed the reporting for Device ID ES 1, Process ID P1: Milking cows. To add the next process (Heifers), click on the orange "Back to Emission Source Process Reference" button circled in red in Image 10 and continue to the following steps.

STEPS TO REPORT THE NEXT PROCESS

Image 12:
To add the next Process (Heifers), click "Add Process/Material/Fuel" button as shown below. Name the Process (i.e. Heifers) in the box and click the "OK" button next to it.

REMINDER:
To report the VOC, PM, and NH_3 emissions from the 300 Heifers, repeat the procedures as illustrated in Image 5 and follow the steps leading to Image 11.



EXAMPLE 2:
Last year, a poultry farm facility raised 5,000 chicken on 100 tons of feed. The manure is sent out of the basin. This poultry does not have any lanes that are flushed with water to a pond.

Image 14: Since this poultry farm does not possess an operating permit, the user must add this emission source by clicking on the link "Add New Emission Source" on the Emission Source page. Once you have followed the procedure illustrated in Images 1-5 you will see the below Emission Source (ES) page. Click on the blue "Open" link in the "Step 1: Process" header.

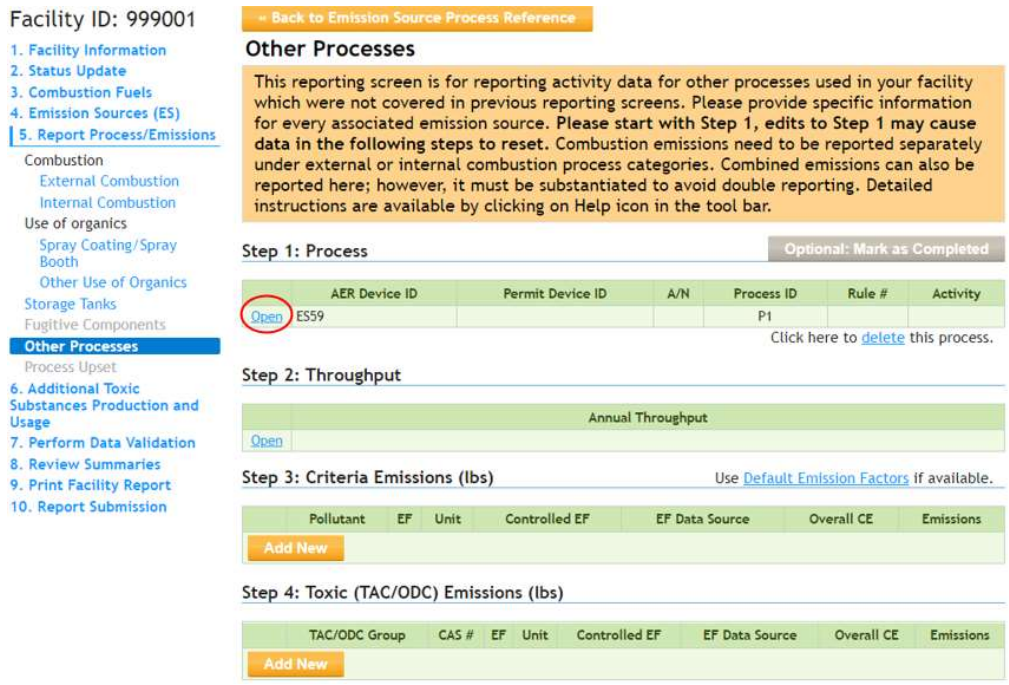


Image 15: Fill in the information for Chicken Manure as shown in the following image. Click the "Save" button.

Image 16: After saving, you will see the below pop-up that states Default TAC and Criteria emission factors have been assigned and will be automatically populated. Click "Ok" to continue. If you would like to change the default emission factors after they have been automatically populated you can follow the steps under **Image 18**.

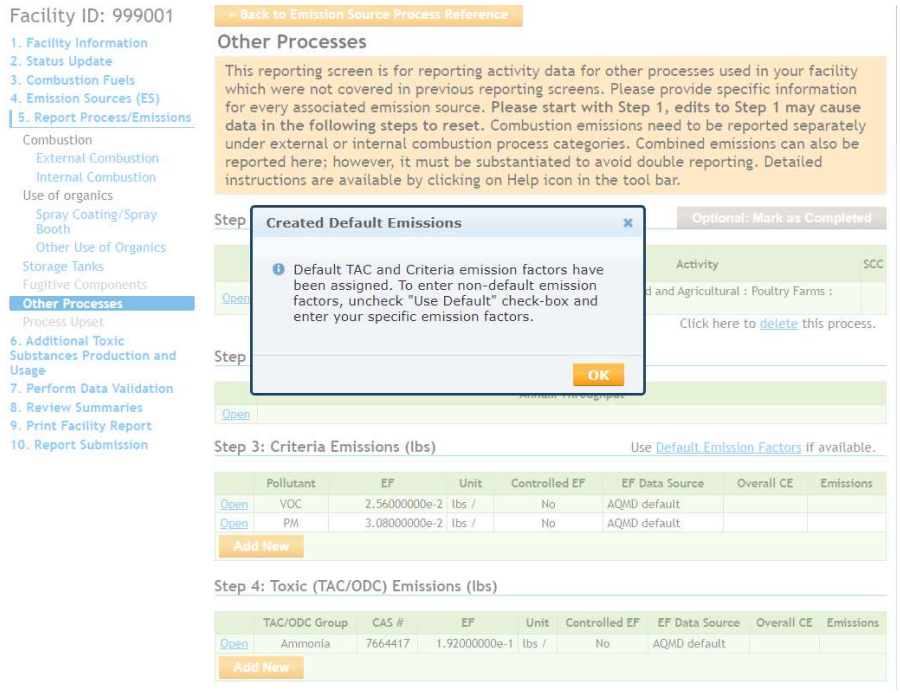


Image 17: Click the "Open" link under "Step 2: Throughput" to add the throughput values for this process.

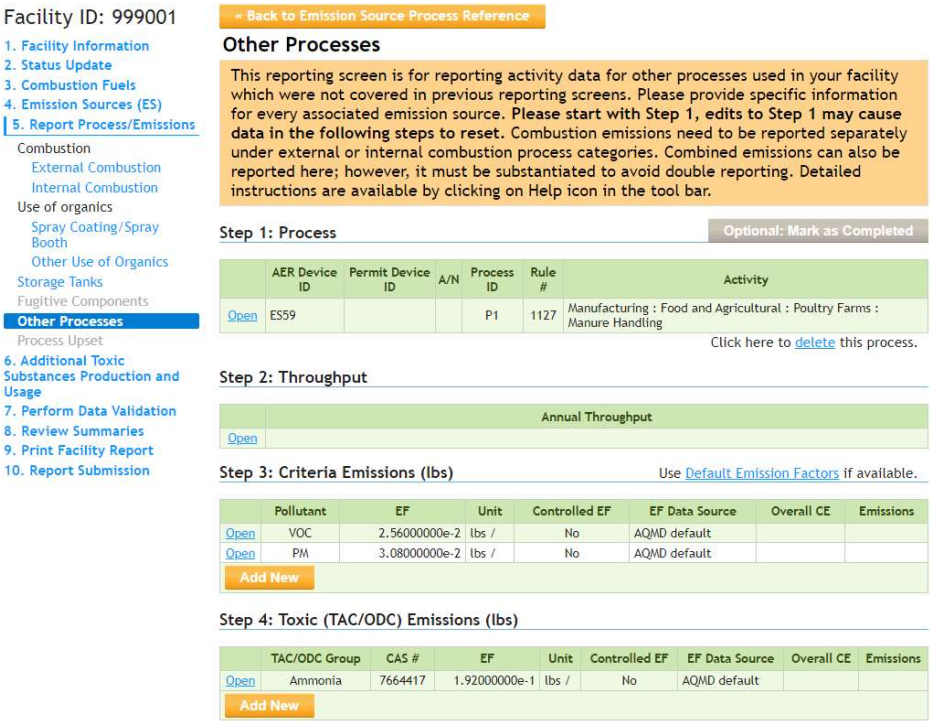


Image 17: Add the throughput section as shown below. Click the "Save" button.

Image 18: After saving, the program returns to Image 5 (the Emission Source ID ES59, Process P1 page). As you see below, since the default Criteria Pollutant and TAC emission factors (EF) were automatically added; the tool automatically calculates the Emissions for VOC, PM and Ammonia.

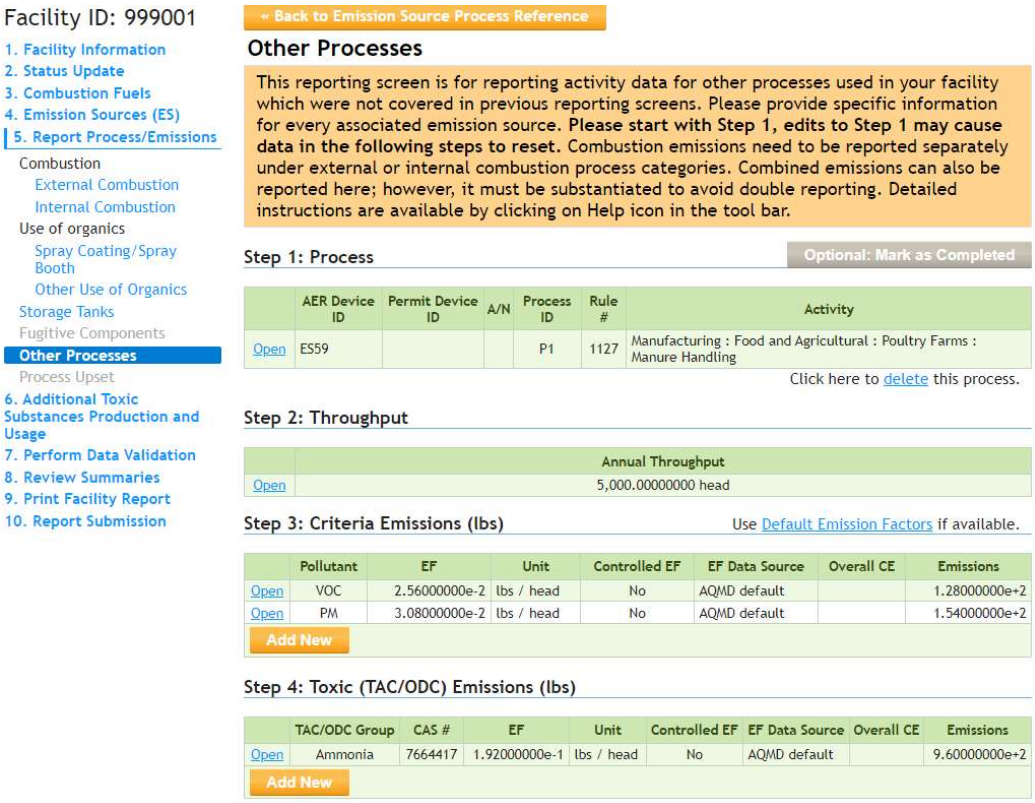


Image 19: If you are eligible for abbreviated reporting under CTR, not using default emission factors will prevent you from submitting an abbreviated report. In other words, only default emission factors are allowed for abbreviated reporting. If you would like to use a facility specific emission factor in place of the the default emission factor that was automatically added by the tool click on the "Open" link next to the pollutant you want to edit. Through the pollutant (in this example is VOC) pop-up, uncheck the Use default checkbox. You can then replace the Emission Factor (EF) and add a control efficiency value by clicking the "Controlled EF value" check box

and entering the correct value in the field provided. Choose from the Emission Factor Data Source drop-down menu the option that best describes the origins of your emission factor. Click on the orange "Save" button. These steps can also be used to add or edit toxic emissions in "Step 4: Toxic (TAC/ODC) Emissions (lbs)".

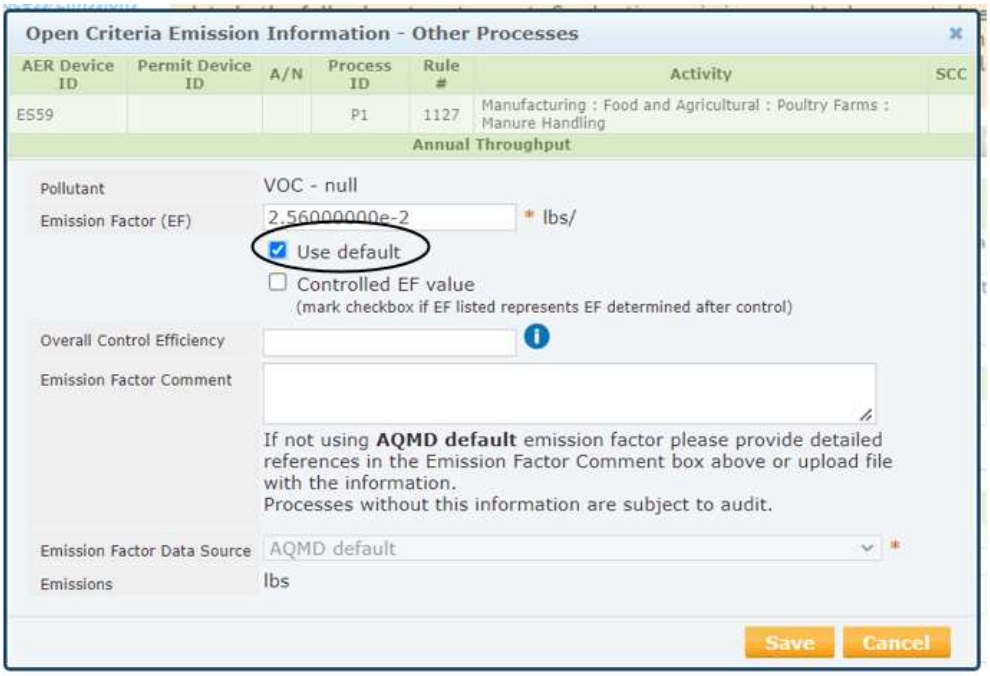


Image 20: To add additional criteria pollutants or Toxics, click the orange "Add New" button found at the bottom of section "Step 3: Criteria Emissions" or "Step 4: Toxics" depending on which type of pollutant you would like to add. You may add the pollutant type from the drop-down menu, add the "Emission Factor (EF)", "Overall Control Efficiency" and "Emission Factor Comment" in the empty fields. Choose the correct "Emission Factor Data Source" from the drop-down menu and click the orange "Save" button.

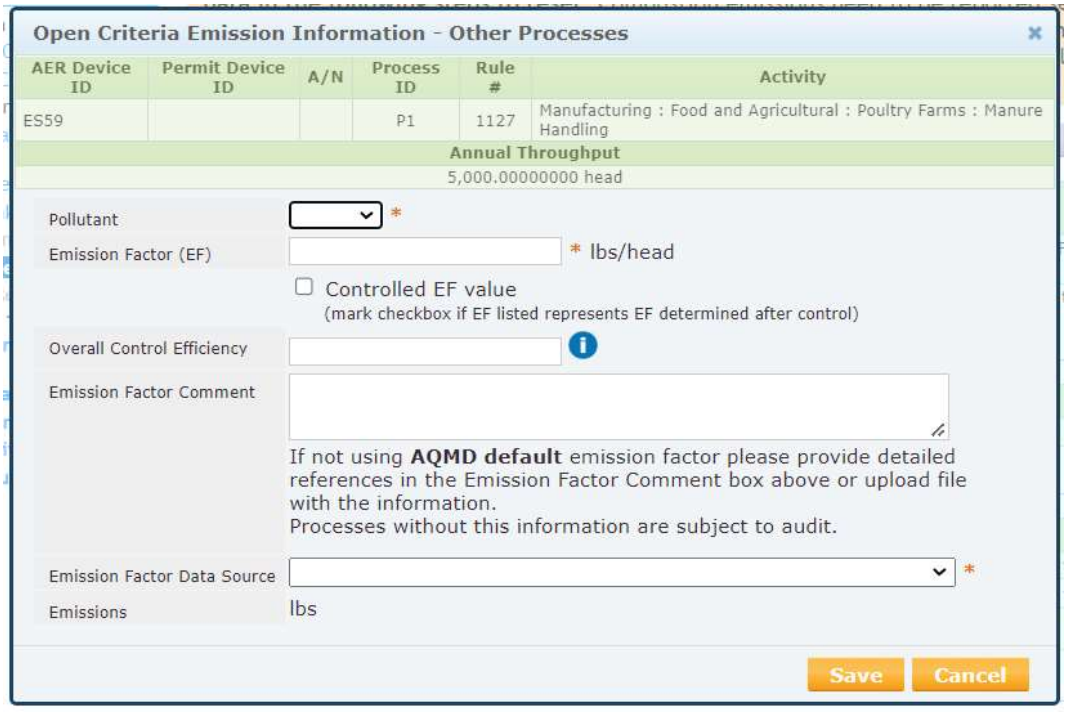
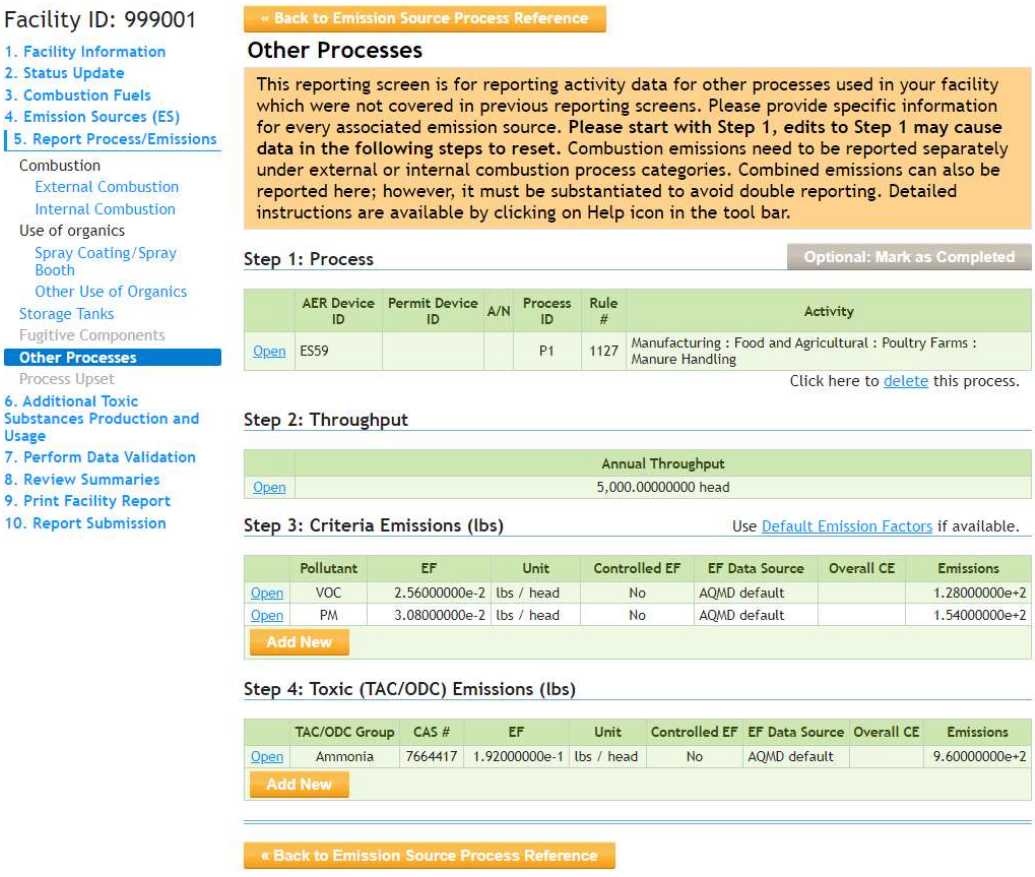


Image 21: You have completed the Process page for Chicken Manure Handling. To add emissions for chicken feed click on the orange "Back to Emission Source Process Reference" to continue to the next image.



STEPS TO REPORT THE NEXT PROCESS FOR PM EMISSIONS FROM FEEDS.

Image 22: The below image is the Process Reference for the Chicken Manure Emission Source you added in Example 2 above. Click the orange "Add Process/Material/Fuel" button, name the process Chicken Feed, and click OK button next to it.

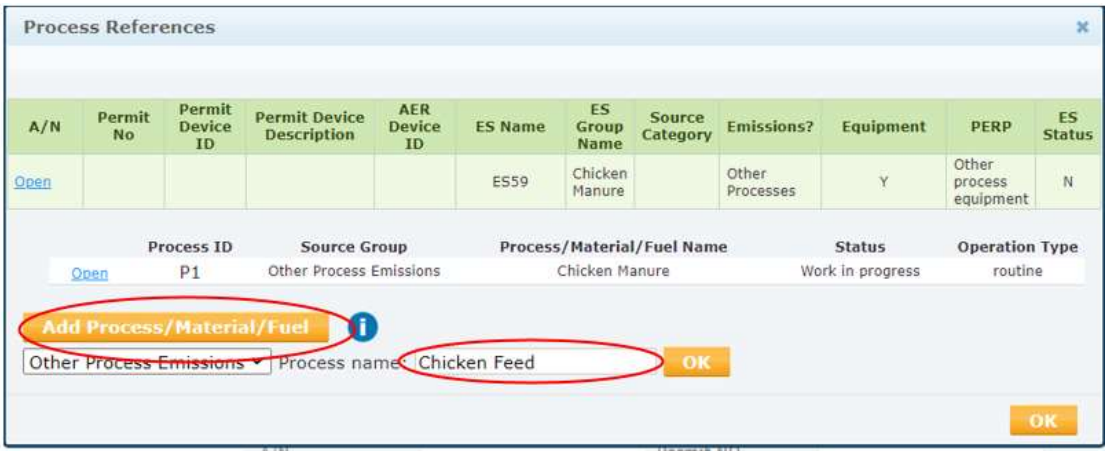


Image 24: After clicking OK, Process ID P2 is added for chicken feed operation as shown below. Click on "Open" next to Process ID P2 to start entering the information for that process.

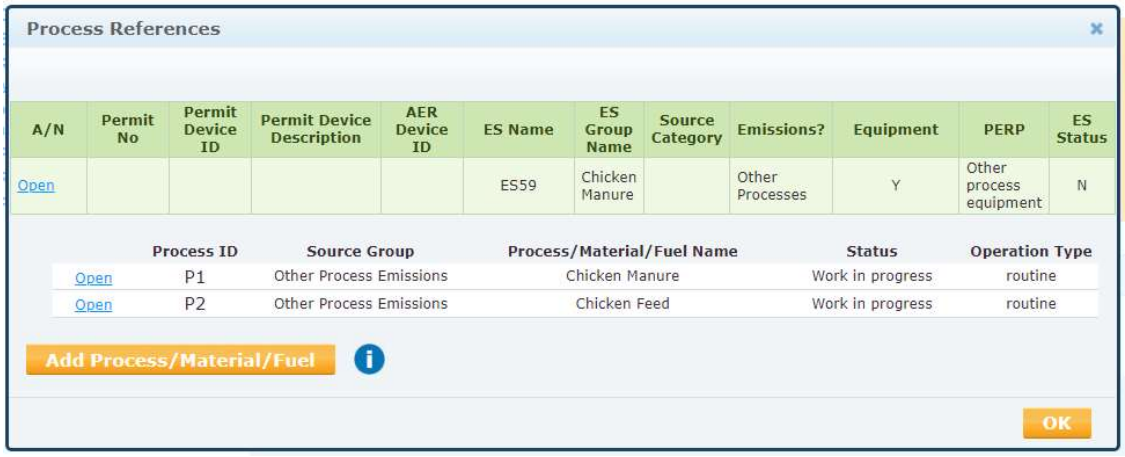


Image 25: After clicking Process ID P2, the tool will open the emission source page for Device ID ES59, Process ID P2 Chicken Feed process. Again, Click on the "Open" link next to "Step 1: Process."

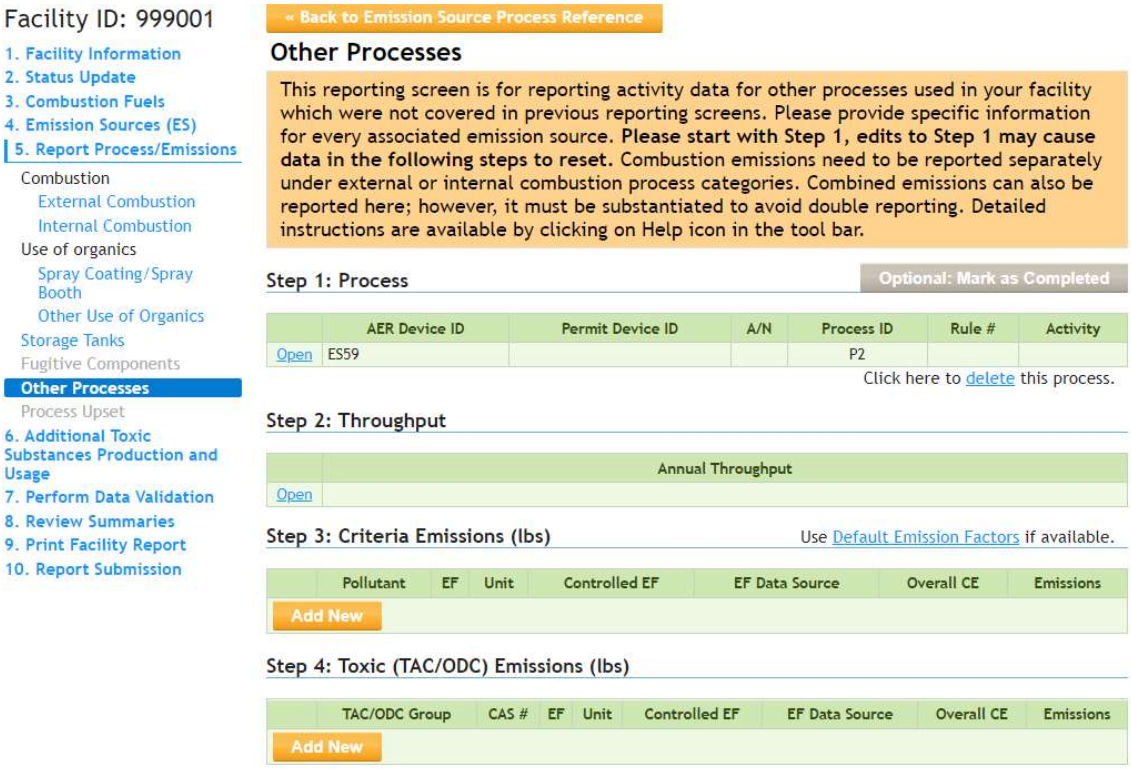


Image 26: The tool presents the user with the process data entry screen. Add the Chicken Feed to the empty "Process Name" field and a "Process Comment" if needed. Use the drop-down arrows at the right of each box to report information for this process as shown below. Click the "Save" button.

Image 27: After saving, the program returns to Image 25. Open the "Step 2: Throughput" section to enter the amount, as shown below. Click "Save" button.

Image 28: After saving, the program returns to the Device ID ES59 Process P1 page for Chicken Feed. As seen below, the Particulate Matter (PM) default emission factor has automatically populated. If you would like to change the default emission factor, click on the "Open" link under the Step 3: Criteria Emissions (lbs)" section and next to "PM". If you are eligible for abbreviated reporting under CTR, not using default emission factors will prevent you from submitting an abbreviated report. In other words, only default emission factors are allowed for abbreviated reporting.

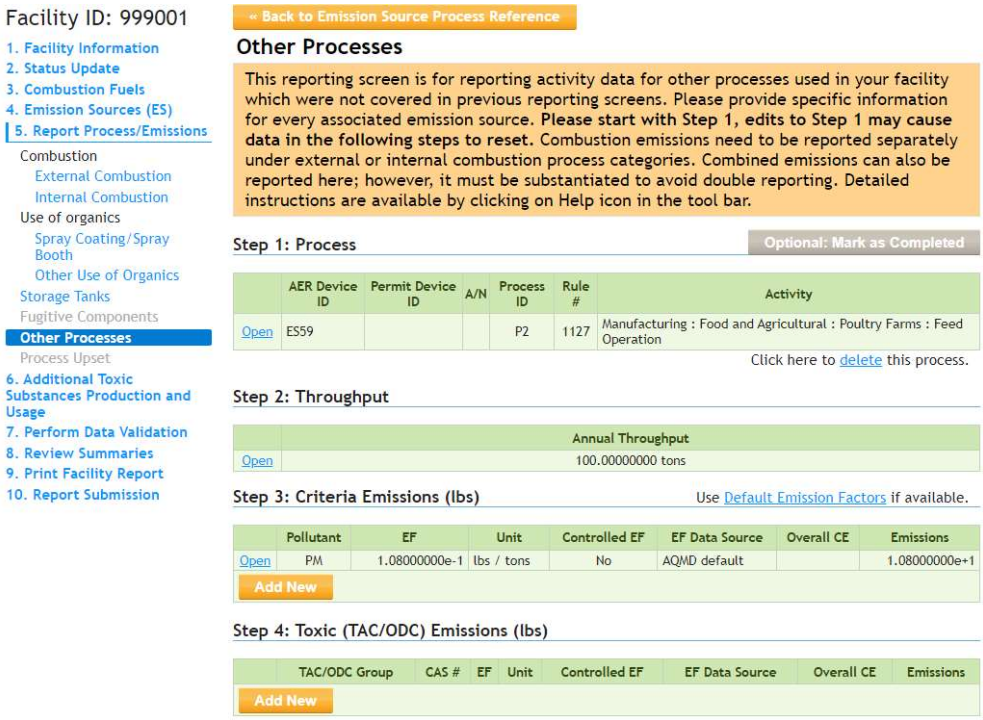


Image 29: Click on the selected check box next to "Use Default". You can now edit the "Emission Factor (EF)" and add a "Overall Control Efficiency" if needed. Add the source you referenced for the emission factor in the "Emission Factor Comment" box. Make sure to select the correct source

for your emission factor on the drop-down menu next to “Emission Factor Data Source”. Click “Save.”

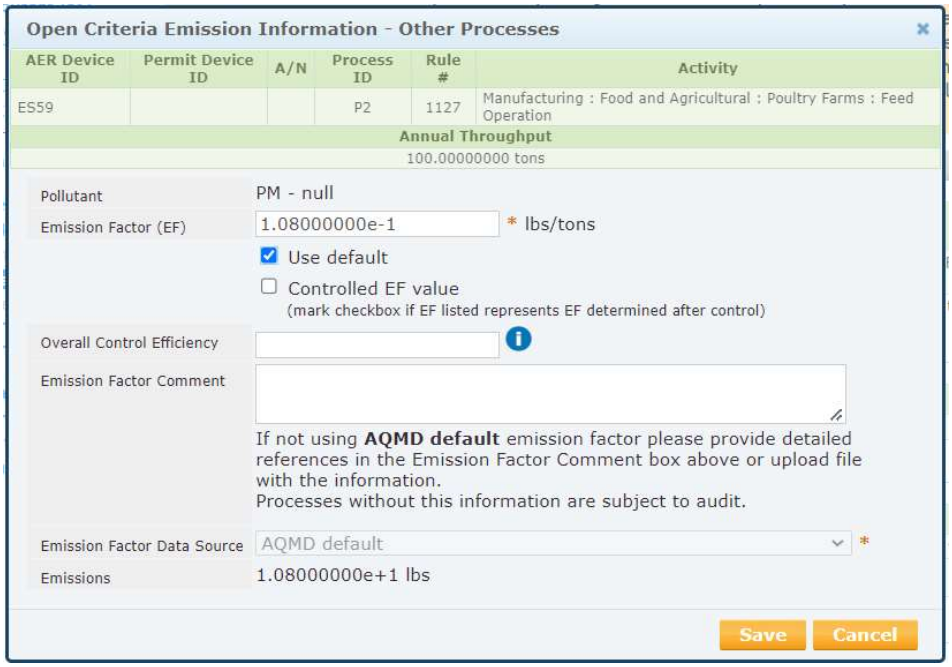


Image 30: To add a new criteria pollutant click on the orange “Add New” button under the “Step 3: Criteria Emissions (lbs)” section.

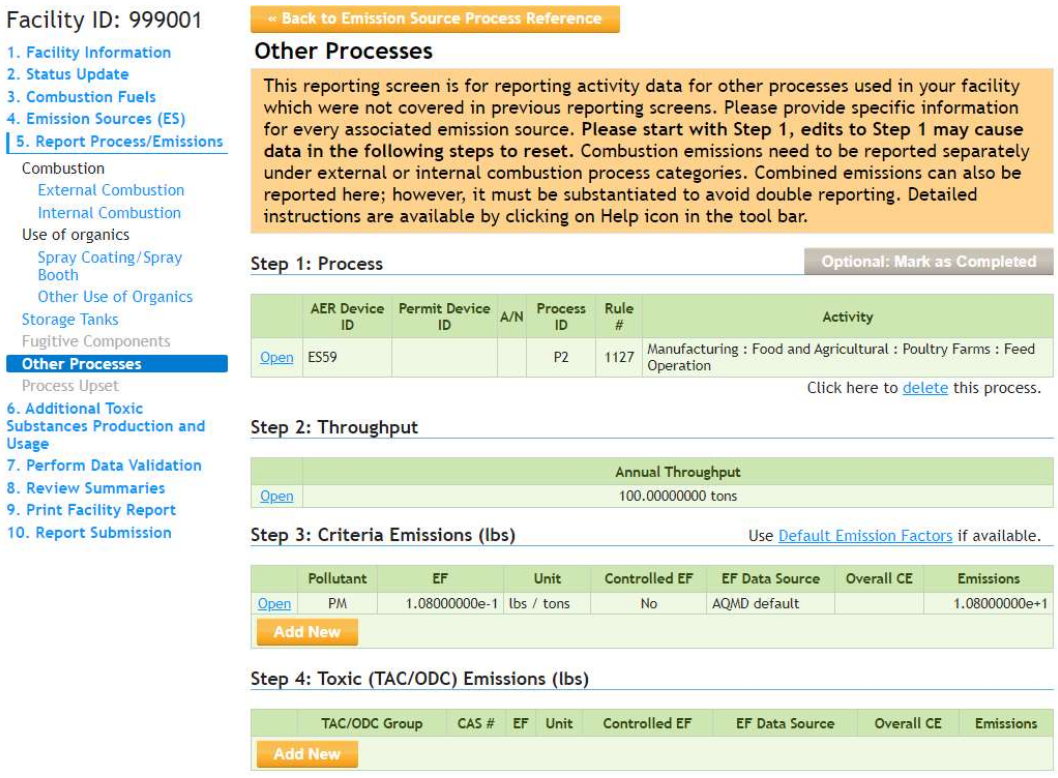
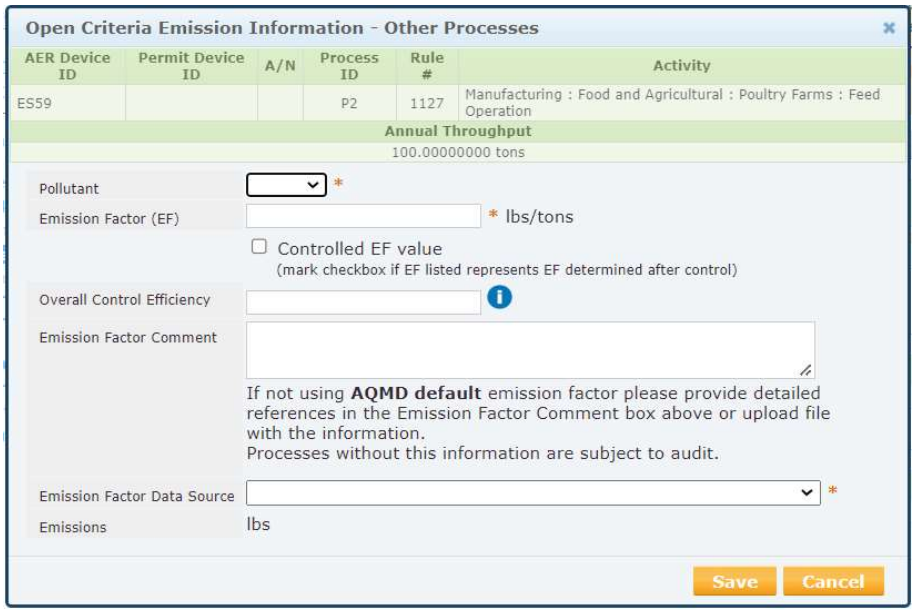


Image 31: Add the new “Pollutant” from the options in the drop-down menu. You can add your emission factor into the empty “Emission Factor (EF)” field. Check the controlled EF value

checkbox if needed, and you may add an "Overall Control Efficiency" in the empty field. Add the source you referenced for the emission factor and/or control efficiency in "Emission Factor Comment" box, and choose the correct option from the drop-down menu for the "Emission Factor Data Source". Click "Save".



You have now successfully completed adding Process IDs P1 Chicken Manure and P2 Chicken Feed under Device ID ES59.