AREA SOURCE EMISSIONS FOR CALENDAR YEAR 2023
METHODOLOGY DOCUMENTATION
LIVESTOCK

DESCRIPTION OF CATEGORY

This category estimates the area source emissions of PM, NH3, and VOC from dairy cattle.

CES	EIC	Description
89516	620-618-0262-0101	Livestock Husbandry – Dairy Cattle

METHODOLOGY AND ASSUMPTIONS

This methodology is the same as that used for the 2022 AQMP, with updates to the cattle population. There are four types of dairy cattle: milking cows, dry cows, heifers, and calves. The throughput of each type of dairy cattle shown in Table 1 are based on the 2023 activity data provided by the Santa Ana Water Control Board (SARWQCB).[1] Emissions can be estimated for each type of cattle using the emission factors (EF) from the South Coast AQMD April 2011 Technology Assessment (TA) report.[2]

Table 1. 2023 dairy cattle (head/year) throughput.

Types	Annual Total Dairy Cattle (head)	Throughput
Milk Cow	79,750	40,446
Dry Cow		9,048
Heifer		16,480
Calf		13,776

PM, NH3 and VOC emissions were estimated using equations (1) for each type of dairy cattle.

$$\text{Emission (pollutant,type)} = \text{Throughput (type)} \times \text{EF (pollutant, type)} \quad (1)$$

Where,

- *Emission*: is the total emissions for the type of dairy cattle (milk cow, dry cow, heifer or calf) and for the pollutant (PM, NH3 or VOC) expressed in pound per year (lb/yr).
- *type*: type of dairy cattle (milk cow, dry cow, heifer, or calf).

[1] Santa Ana Water Control Board, April 2025, 2023 Dairy Annual Report (Link: E:\PM Strategies\PAR 1127\AQMP Inventory 2025\Summary Information_2023 Dairy Annual Report_Animal Population_external)
[2] South Coast AQMD, April 2011, TECHNOLOGY ASSESSMENT– 2007 AQMP CM# MCS-05 (Link: E:\PM Strategies\PAR 1127\042711 PAR 1127 Tech Assessment_r1.doc)

- *Throughput*: head count by type per year (head/yr).
- *EF*: is the emission factor by pollutant (PM, NH3 or VOC) and type expressed in pounds/head (lb/head). EFs are based on the TA.

Weighted Emission Factors for each pollutant can be determined using equation (2).

Pollutant Weighted Emission Factor (EF_w) = Total Pollutant Emissions / Annual Total Dairy Cattle (2)

Where,

- *Pollutant Weighted Emission Factor (EF_w)*: by pollutant (PM, NH3 or VOC) for all dairy cattle expressed in pound/head (lb/head)
- *Total Pollutant Emissions*: total emissions by pollutant (PM, NH3 or VOC) for each dairy cattle type expressed in pound per year (lb/yr). Total Emissions= Emissions (Milk Cow) + Emissions (Dry Cow) + Emissions (Heifer) + Emissions (Calf)

Table 2 shows the EF_w for each pollutant.

Table 2. Weighted emissions factors for dairy cattle by pollutant.

Pollutant	EFw (lbs/head)
PM	3.56
NH3	52.50
VOC	9.70

Control Factor

Control factors (CF) based on Rule 1127 implementation were used: CFs for NH3 are 0.74 and VOC 0.63. PM does not have CF.

SUMMARY AND NEW EMISSIONS

Table 3 shows the new dairy cattle emission inventory based on updated throughput values provided by the SARWQCB.

Table 3. Emissions from dairy cattle in 2023 (tpd)

Pollutants	2022 AQMP	Prospective SIP/AQMP
PM	0.45	0.39
NH3	5.01	4.24
VOC	0.78	0.67

DESCRIPTION OF CATEGORY

This category estimates the area source emissions of PM, NH3 and VOC from poultry layers.

CES	EIC	Description
89557	620-618-0262-0105	Livestock Husbandry – Layers

METHODOLOGY AND ASSUMPTIONS

This methodology is the same as that used for the 2022 AQMP, with updates to the poultry population. PM, NH3 and VOC emissions were estimated using equations (4).

Emission= Throughput × Emission Factor (EF) / 2000 (4)

Where,

- *Emission*: is expressed in ton per year (ton/yr).
- *Emission Factor (EF)*: is expressed in pound/head (lb/head).
- Conversion factor: 2,000 pound per ton.

Emission factors are based on Technology Assessment April 2011. Throughput is based on the 2022 USDA census of agriculture in Los Angeles, Orange, Riverside and San Bernardino counties.[3]

SUMMARY AND NEW EMISSIONS

Table 4 shows the poultry layers emission inventory based on updated throughput compared to the values used in the 2022 AQMP.

Table 4. Emissions from poultry layers in 2023 (tpd)

Pollutants	2022 AQMP	Prospective SIP/AQMP
PM	0.06	0.08
NH3	0.34	0.49
VOC	0.05	0.07

[3]https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_2_County_Level/California/st06_2_012_012.pdf

DESCRIPTION OF CATEGORY

This category estimates the area source emissions of NH3 and VOC from swine.

CES	EIC	Description
89573	620-618-0262-0107	Livestock Husbandry – Swine

METHODOLOGY AND ASSUMPTIONS

NH3 and VOC emissions were estimated using equations (4). Emission factors are based on Technology Assessment April 2011. Throughput is based on 2022 USDA census of agriculture in Los Angeles, Orange, Riverside and San Bernardino counties.[4] There is only one swine facility in the Basin. All emissions are allocated to Riverside County.

SUMMARY AND NEW EMISSIONS

Table 5 shows the swine emission inventory based on updated throughput compared to the values used in the 2022 AQMP.

Table 5. Emissions from swine in 2023 (tpd)

Pollutants	2022 AQMP	Prospective SIP/AQMP
NH3	0.02	0.04
VOC	0.005	0.009

[4]https://www.nass.usda.gov/Publications/AgCensus/2022/Full_Report/Volume_1,_Chapter_2_US_State_Level/st99_2_019_019.pdf