AREA SOURCE EMISSIONS FOR CALENDAR YEAR 2023
METHODOLOGY DOCUMENTATION
COMPOSTING - CO-COMPOSTING - BIOSOLIDS AND GREENWASTE MIX

DESCRIPTION OF CATEGORY

This category estimates the area source emissions of VOC and ammonia (NH3) from co-composting operations that compost biosolids and/or manure with bulking agents in windrows or using add-on control methods, such as aerated static piles (ASP) or in-vessel systems.

CES	EIC	Description
90475	199-170-0270-0000	Composting - CO-Composting – Biosolids and Greenwaste Mix

METHODOLOGY AND ASSUMPTIONS

The emissions inventory for co-composting operations was quantified based on the methodology developed in the Annual Emission Reporting (AER) guideline document for co-composting operations (South Coast AQMD, 2023) for CES 90475 and updated with 2023 activity data (i.e., annual co-composting feedstock throughput) or based on site-specific emission factors developed from source testing. Emission factors for this category are a function of the type of co-composting feedstock/operations and their corresponding control efficiency (uncontrolled vs. controlled). The VOC and ammonia baseline emission factors were initially developed as part of Rule 1133.2 – Emission Reductions from Co-Composting Operations (adopted 01/10/03), based on the South Coast AQMD source tests conducted in 1995 and 1996 for three windrow co-composting facilities. The baseline emission factors for VOC and ammonia are 1.78 and 2.93 lbs/ton of throughput (i.e., composting feedstock received at the facility), respectively. Baseline emissions from co-composting operations are estimated by multiplying the facilities annual throughput by these average emission factors. Emissions from controlled co-composting operations are estimated by use of site-specific emission factors developed from the most recent source test of the co-composting operations.

Relying on site-specific emission factors developed from the most recent source test of the co-composting operation is a departure from past practice in the 2016 and 2022 AQMPs. At the time of those area source emission inventories, source testing had not yet been performed at all co-composting operation with add-on controls. For the 2027 AQMP, all co-composting operations with add-on controls have completed source testing and using site-specific emission factors based on newly-completed source testing is expected to yield more accurate area source emission inventories.

Under Rule 1133.2, existing co-composting operations that have begun operations on or before January 10, 2003 are required to reduce emissions of VOC and NH3 by 70% via an add-on control method, while new co-composting operations that have not started operations as of January 10, 2003 are required 80% reductions in VOC and NH3 emissions. These emission reduction requirements do not apply to certain composting operations, including greenwaste composting operations, agricultural composting operations, woodwaste composting operations, co-composting operations with a design capacity of less than 1,000

tons of throughput per year, and existing co-composting operations with a design capacity of less than 35,000 tons of throughput per year containing no more than 20% biosolids, by volume. Greenwaste composting operations, by its definition, mean composting greenwaste only or greenwaste in combination of up to 20% manure, by volume.

Co-composting facilities are required to register the facilities operations to the South Coast AQMD as required in Rule 1133 – Composting and Related Operations – General Administrative Requirements, and then to update their operations annually. Facilities annual throughput was collected from the Rule 1133 Registration/Annual Update database for calendar year 2023. If the 2023 throughput data was not available, the total throughput available in the next most recent year (2022) was used as a substitute.

For exempt co-composting operations, controlled emission factors are assumed to be the same as uncontrolled emission factors. For controlled co-composting operations, the site-specific emission factor developed from the most recent source test was used. A county-specific composite emission factor for a pollutant is determined by, for all facilities located in the county, dividing the sum of baseline or controlled emissions of the pollutant by the sum of throughput.

The following assumptions were made in calculating emissions for this area source category:

- The total throughput data provided by each co-composting facility as reported in the Rule 1133 Registration/Annual Update database is accurate.
- The co-composting operations reported to Rule 1133 Registration/Annual Update are comprehensive.
- County-specific composite emission factors are calculated to accommodate two different emission control efficiencies (no control or add-on control) within the county by taking account of total facilities annual throughput.

SUMMARY AND NEW EMISSIONS

- Facilities annual co-composting throughput comes from 2023 Rule 1133 databases, or 2022 if 2023 was not available
- Uncontrolled emission factors in lbs/ton = 1.78 for VOC and 2.93 for NH3
- Controlled emission factors (EF_c in lbs/ton) = (MER_c in lbs/hr) x (hr/yr) / Annual Throughput (ton/yr)

  Where MER_c is the mass emission rate of the co-composting operation after add-on control.

Table 1. Total throughput and emission factors, by facility and county

Facility*	County	Throughput (tons/yr)	VOC EF_c (lbs/ton)	NH3 EF_c (lbs/ton)
A	Los Angeles	2,293	1.83	0.70
B	Los Angeles	3,957	1.00	0.03
C	San Bernardino	8,755	1.78	2.93
D	San Bernardino	193,041	0.04	0.02

* In the 2022 AQMP, a total of six (6) facilities were identified as conducting co-composting operations. Three (3) of those facilities, identified then as Facility C, E, and F, no longer conduct co-composting operations. One (1) additional facility, now identified as Facility C, has been identified as conducting co-composting operations.

Table 2. Total VOC and NH3 emissions in the South Coast Air Basin:

County	# of Facilities	Total Throughput (tons/yr)	VOC (tons/year)	NH3 (tons/year)
Los Angeles	2	10,216	4.06	0.87
San Bernardino	2	257,844	11.69	15.02
South Coast Air Basin	**4**	**268,060**	**15.75**	**15.89**

Table 3. Emissions for year 2023 (for the South Coast Air Basin):

	2022 AQMP*		Prospective SIP/AQMP**	
Pollutant	**VOC**	**NH3**	**VOC**	**NH3**
Emissions (tpy)	113.63	187.04	15.75	15.89
Emissions (tpd)	0.31	0.51	0.043	0.044

* Using default control efficiency for add-on controls derived from rule requirements
** Using site-specific emission factors derived from most recent facility source testing

REFERENCES

South Coast AQMD, Guidelines for Calculating Emissions from Greenwaste Composting and Co-composting Operations, Revised February 2023 .