AREA SOURCE EMISSIONS FOR CALENDAR YEAR 2023
METHODOLOGY DOCUMENTATION
COMPOSTING - SOLID WASTE (UNSPECIFIED) - CHIPPINGS AND GRINDINGS

DESCRIPTION OF CATEGORY

This category estimates the area source emissions of VOC and NH3 from the stockpiling of chipped and ground greenwaste, or grass clippings, leaves, tree and shrub trimmings, and plant remains organic waste generated from gardening, agriculture, or landscaping. Greenwaste, once collected and screened, is chipped and ground to produce multiple products, including composting feedstock, biomass power generation, alternative daily cover (ADC) for landfills, anaerobic digestion, and direct land application at farms and agricultural operations. Stockpiling of chipped and ground greenwaste, prior to removal for other uses, is known to emit VOC and NH3 to atmosphere.

CES	EIC	Name
90474	199-170-0240-0116	COMPOSTING - SOLID WASTE (UNSPECIFIED) - CHIPPINGS AND GRINDINGS

METHODOLOGY AND ASSUMPTIONS

Emission methodology has been updated since the last emissions inventory. VOC and NH3 emissions from the chipped and ground greenwaste are estimated based on South Coast AQMD Rule 1133.1 requirements (South Coast AQMD, 2011) and the methodology developed for the South Coast AQMD Proposed Amended Rule 1133 Series, developed in 2025 (South Coast AQMD, 2025). The stockpile emission factor used was developed by the San Joaquin Valley Air Pollution Control District in their Compost Emission Factor Report, revised in 2023 (SJVAPCD, 2023).

Uncontrolled Emission Factors

VOC and NH3 emissions can be estimated using equation (1) when the emissions are not being controlled prior to release into the atmosphere.

$$Emission = Throughput \times Stockpile\ Emission\ Factor \times Days \quad (1)$$

Where,

Emission: VOC or NH3 emissions expressed in pounds per year (lb/yr).

Throughput: Mass of greenwaste in tons per year (ton/yr), as received by a facility and produced through chipping and grinding.

Stockpile Emission Factor (EF_s): SJVAPCD default stockpile emission factors for organic material.

Days: The number of days the greenwaste is stockpiled at the chipping and grinding facility. Rule 1133.1 requires that materials be used onsite or removed from the facility within 48 hours, extendable up to seven (7) days with Local Enforcement Agency Approval. For the purpose of this area source emission estimate, seven (7) days is used.

The uncontrolled emission factors are listed under Table 1 and Table 2.

Table 1. Stockpile Daily Emission Factors for Greenwaste

Operation	VOC EF_u (lbs/ton/day of throughput)	NH3 EF_u (lbs/ton/day of throughput)
Stockpiling	0.2	0.02

Table 2. Stockpile Emission Factors for Greenwaste

Operation	VOC EF_u (lbs/ton of throughput)	NH3 EF_u (lbs/ton of throughput)
Stockpiling for seven (7) days	1.4	0.14

Activity Data

Annual chipping and grinding throughput estimates use 2023 actual annual throughput for the facilities that reported to the South Coast AQMD under the Rule 1133 Registration/Annual Update requirements. If the 2023 throughput data was not readily available for the facility, the total actual throughput available in a most recent year (between 2017 and 2022) was used as a substitute. Combining the total annual throughputs and dividing by the total acreage of the reporting facilities yielded a conversion factor of estimated annual throughput per acre, calculated and rounded to 1,000 tons per acre.

In those cases where chipping and grinding throughput data was not readily available, an estimation of throughput was calculated based on the facility acreage as reported to the CalRecycle Solid Waste Information System (SWIS). If SWIS data was not available, facility acreage was estimated using publicly-available satellite image tools or other public sources. Using this conversion factor of 1,000 tons per year per acre, estimates of chipping and grinding throughput were calculated for the other facilities that did not recently report to South Coast AQMD under the Rule 1133 requirements.

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

- The total actual throughput data provided by each greenwaste facility as reported in the Rule 1133 Registration/Annual Update database is accurate.
- The record on the greenwaste operations reported to Rule 1133 Registration/Annual Update is comprehensive and is the best resource available.
- The total acreage for each facility as reported to SWIS or estimated by satellite image tools or other public sources is accurate.

The number of facilities conducting greenwaste chipping and grinding operations and the throughput of greenwaste chipping and grinding operations has increased substantially from when last reported in the 2022 AQMP, then based on 2018 data. The reason for this increase is believed to be associated with substantial implementation of California Senate Bill 1383 (SB 1383) regarding short-lived climate pollutants. SB 1383 set a target to reduce organic waste, including greenwaste, sent to landfills by 75% by 2025 and the increase in the number of greenwaste chipping and grinding facilities and greenwaste chipping and grinding throughput is a result of increased diversion of greenwaste from landfills to greenwaste facilities.

SUMMARY AND NEW EMISSIONS

Total Throughput

Facilities' annual actual throughput comes from calendar year 2017-2023 Rule 1133 database. Total facility throughput by county and VOC and NH3 emission factors for chipped and ground greenwaste are given in Table 3. Total facility throughput by air basin and VOC and NH3 emission factors for chipped and ground greenwaste are given in Table 4.

Table 3. County-Specific Throughput and VOC and NH3 Emission Factors for Chipped and Ground Greenwaste

County	# of Facilities	Throughput (tons/year)	VOC EF_u (lbs/ton)	NH3 EF_u (lbs/ton)
Los Angeles	30	798,531	1.4	0.14
Orange	20	595,900	1.4	0.14
Riverside	26	610,761	1.4	0.14
San Bernardino	22	454,835	1.4	0.14
South Coast AQMD	98	2,460,027	1.4	0.14

Table 4. Air Basin-Specific Throughput and VOC and NH3 Emission Factors for Chipped and Ground Greenwaste

County	# of Facilities	Throughput (tons/year)	VOC EF_u (lbs/ton)	NH3 EF_u (lbs/ton)
South Coast Air Basin	88	2,167,432	1.4	0.14
Coachella Valley	10	292,595	1.4	0.14
Mojave Desert	0	0	1.4	0.14
South Coast AQMD	98	2,460,027	1.4	0.14

VOC and NH3 Emissions

VOC and NH3 emissions by county are calculated using equation (1) from throughput and uncontrolled emission factors in Table 3. VOC and NH3 emissions by air basin are calculated using equation (1) from throughput and uncontrolled emission factors in Table 4. The detailed breakdown by county and by air basin, along with emissions factors and total annual/daily emissions rates, are shown in Table 5, Table **6**, and Table **7**.

Table 5. Total VOC and NH3 Emissions by County in the South Coast AQMD

County	Throughput (tons/year)	VOC (tons/year)	NH3 (tons/year)
Los Angeles	798,531	559.0	55.9
Orange	595,900	417.1	41.7
Riverside	610,761	427.5	42.8
San Bernardino	454,835	318.4	31.8
South Coast AQMD	2,460,027	1,722.0	172.2

Table 6. Total VOC and NH3 Emissions by Air Basin in the South Coast AQMD

County	Throughput (tons/year)	VOC (tons/year)	NH3 (tons/year)
South Coast Air Basin	2,167,432	1,517.2	151.7
Coachella Valley	292,595	204.8	20.5
Mojave Desert	0	0	0
South Coast AQMD	2,460,027	1,722.0	172.2

Table 7. Emissions for Base Year 2023 (for the South Coast AQMD)[1]

	2022 AQMP		Prospective SIP/AQMP	
Pollutant	VOC	NH3	VOC	NH3
EF (lbs/ton)	4.67	0.66	1.4	0.14
Emissions (tpy)	1,742	246	1,722	172
Emissions (tpd)	4.77	0.67	4.72	0.47

[1] The 2022 AQMP emissions include direct land application of chip and grind greenwaste, while the 2027 AQMP emissions only include chip and grind greenwaste while at the chipping and grinding facility.

REFERENCES

1. South Coast AQMD, Final Staff Report for Proposed Rule 1133.3 – Emission Reductions for Greenwaste Composting Operations, July 2011.
2. South Coast AQMD, Preliminary Draft Staff Report for Proposed Amended Rule 1133.3 Series - Composting, Chipping and Grinding, and Related Operations, June 2025.
3. San Joaquin Valley Air Pollution Control District, Compost Emission Factor Report, revised March 21, 2023.