AREA SOURCE EMISSIONS FOR CALENDAR YEAR 2023
METHODOLOGY DOCUMENTATION
PAVED ROAD DUST

DESCRIPTION OF CATEGORY

This category estimates the emissions of TSP, PM10 and PM2.5 from resuspended particles of road dust, and disaggregates the emissions into the five categories listed below:

CES	EIC	Description
83618	640-635-5400-0000	Paved Road Travel - Freeways - Dust
47456	640-636-5400-0000	Paved Road Travel - (Unspecified) - Dust
83626	640-637-5400-0000	Paved Road Travel – Major Streets - Dust
83634	640-639-5400-0000	Paved Road Travel – Collector Streets - Dust
83642	640-641-5400-0000	Paved Road Travel – Local Streets - Dust

METHODOLOGY AND ASSUMPTIONS

The Southern California Association of Governments (SCGA) provided 2023 travel demand link data ('lodinfo' files) containing traffic volume data for road segments within South Coast AQMD's jurisdiction, including the Mojave Desert Air Basin (MDAB) and Salton Sea Air Basin (SSAB) portions of Riverside County. Data provided includes the length of each road segment, the air basin containing each segment, area type (urban, suburban, rural, etc.), functional class (local, highway, arterial, collector, etc.), as well as information on the average number of vehicles traversing the road segment by vehicle type (LDV, MDV, LHDT, MHDT, HHDT, and Preloaded Bus). Traffic volume data is available by time of day: AM Peak (6am-9am), Midday (9am-3pm), PM Peak (3pm-7pm), Evening (7pm-9pm), and Night (9pm-6am).

We estimated the PM10 road dust emission factor for each individual road segment and time of day (AM, Midday, PM, Evening, Night) using the US EPA's AP-42[1] emission factor equation below:

$$E = [k(sL)^{0.91} \times (W)^{1.02}] \times (1 - P/4N)$$

where,

E = the particulate emission factor in units of pounds of particulate matter per VMT,

k = the U.S. EPA AP-42 particle size multiplier (PM10 = 0.0022 lb/VMT),

sL = the roadway-specific silt loading in grams/square meter (g/m2),

W = the average weight of vehicles traveling the road (tons),

[1]AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources (https://www.epa.gov/sites/production/files/2020-10/documents/13.2.1_paved_roads.pdf)

P = number of "wet" days, when at least one site per county received at least 0.01 inch of precipitation during the annual averaging period, and

N = the number of days in the annual averaging period (default = 365).

The default values provided in the CARB paved road dust guidance document[2] were used for the following parameters: particle size multiplier (*k*) and number of days in the annual averaging period (*N*). The average number of rainfall days, *P*, was taken from local airport data – see Table 1 below. A value of 33 rainfall days was used for SCAB and 16 rainfall days for MDAB and SSAB. The average weight of vehicles traveling the road segment, *W*, was calculated by taking a weighted average by vehicle type.

Table 1. Days of daily accumulated precipitation larger than 0.01 inch

	Airport			
Year	FUL	ONT	PSP	SNA
2019	48	44	25	46
2020	22	23	12	27
2021	28	29	14	31
2022	24	23	9	23
2023	42	48	19	45
2024	30	34	14	26
Average	**32**	**34**	**16**	**33**

County- and roadway-specific silt loading factors, *sL*, were taken from page 6 of the CARB paved road dust guidance document. In order to assign the correct silt loading factor, each road segment was classified based on Area Type and Functional Class. Table 2 describes how Area Type was reclassified into URBAN and RURAL categories and Table 2 displays how each road segment was classified based on both the Area Type and Functional Class.

Table 2. Classifying road segments by area type

Area Type	
Data	Reclassified as:
1 = Core	URBAN
2 = Central Business District	URBAN
3 = Urban Business District	URBAN
4 = Urban	URBAN
5 = Suburban	URBAN
6 = Rural	RURAL
7 = Mountain	RURAL

[2]MISCELLANEOUS PROCESS METHODOLOGY 7.9 Entrained Road Travel, Paved Road Dust: (https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full7-9_2018.pdf)

We assumed the average weight to be the midpoint of the weight range for each vehicle type (see Table 4 below). Plugging in the average weight of vehicles to the equation above allows you to calculate the PM10 emission factor for each road segment during the five distinct time intervals. Multiplying the emission factor by the length of the road segment gives you the PM10 emissions for that road segment during the specified time interval. Once PM10 emissions are calculated, the corresponding amount of Total PM and PM2.5 emissions can be found by applying the appropriate scaling factor (Total PM = 2.187; PM2.5 = 0.150).

Table 3. Classifying road segments by functional class

Functional Class	
Data	**Reclassified as:**
10 = Freeway	FREEWAY
20 = HOV	FREEWAY
30 = Expressway/Parkway	FREEWAY
40 = Principal Arterial	MAJOR
50 = Minor Arterial	MAJOR
60 = Major Collector	COLLECTOR
70 = Minor Collector	COLLECTOR if URBAN, LOCAL if RURAL
80 = Ramps	FREEWAY
90 = Truck Lane	FREEWAY
100 = TAZ Centroid Connector	LOCAL

Table 4. Average weight by vehicle type

Vehicle	Weight (tons)
LDV	2.13
MDV	2.13
LHDT	5.63
MHDT	11.75
HHDT	23.25
BUS	16.00

SUMMARY AND NEW EMISSIONS

Below, emissions from the 2027 AQMP and 2022 AQMP are compared, both using the base year 2023.

Table 5. Emission of PM10 in SCAB for the year 2023, in tons per day

Description	2022 AQMP	Prospective SIP/AQMP
Paved Road Travel - Freeways - Dust	15.82	14.43
Paved Road Travel - (Unspecified) - Dust	1.65	1.50
Paved Road Travel – Major Streets - Dust	14.33	14.50
Paved Road Travel – Collector Streets - Dust	2.55	2.80
Paved Road Travel – Local Streets - Dust	24.51	26.34