MISCELLANEOUS PROCESS METHODOLOGY 7.9
Entrained Road Travel, Paved Road Dust

(Revised and updated, November 2016)

EMISSION INVENTORY SOURCE CATEGORY
Miscellaneous Processes / Road Dust

EMISSION INVENTORY CODES (CES CODES) AND DESCRIPTION
640-635-5400-0000 (83618) Paved Entrained Road Dust - Freeways
640-637-5400-0000 (83626) Paved Entrained Road Dust - Major Streets
640-639-5400-0000 (83634) Paved Entrained Road Dust - Collector Streets
640-641-5400-0000 (83642) Paved Entrained Road Dust - Local Streets
640-643-5400-0000 (89656) Paved Entrained Road Dust - Rural Streets
640-636-5400-0000 (47456) Paved Entrained Road Dust - Unspecified Paved Roads

METHODS AND SOURCES

The paved road dust category includes emissions of particulate matter (PM) from resuspended road surface material that is entrained by vehicular travel on public and industrial paved roads. Entrained paved road dust, or fugitive dust, contributes to airborne PM emissions throughout California. Because it is not feasible to directly measure region-wide emissions from travel on paved roads, ARB computes emissions using the emission factor equation provided in the Final Section of the Fifth Edition, Volume 1, Chapter 13.2.1, of the U.S. EPA's AP-42 document (January 2011).[1] The emission factor equation was derived from regression analyses of 83 tests for PM_{10} on public and industrial paved roads. Airborne PM emissions were most closely correlated with vehicle weight and silt loading (the mass of material 75 microns or less per square meter of roadway). Inputs to the paved road dust emission factor equation were developed from California-specific roadway silt loading measurements [2,3,4,5] and average vehicle weight data measured by Midwest Research Institute (MRI).[5] This updates estimates California paved road dust emissions for 2012. Data from the ARB, air districts and transportation planning agencies were used to estimate county-specific vehicle miles traveled (VMT).[6] California Department of Transportation (Caltrans) Highway Performance Monitoring System (HPMS) data were used to estimate the fraction of travel on each of four road types in each county: freeway, major, collector, and local.[7,8] Western Regional Climate Center precipitation data were used to estimate the number of days per year that each county within air basin received 0.01 inch or greater of precipitation.[9]

OVERVIEW OF ESTIMATION METHODOLOGY

Particulate emissions less than 10 microns in diameter (PM_{10}) from re-suspension of road surface material by vehicle travel on paved roads (entrained paved road dust) are computed using the emission factor equation in the Final Section of the U.S. EPA's January 2011 AP-42, Fifth Edition, Volume 1, Chapter 13.2.1.[1] The methodology does not include directly emitted motor vehicle emissions (exhaust, brake or tire wear), nor TOG, CO, NOx, SOx, or PM exhaust emissions; these emissions are included in ARB's motor vehicle emission inventory.[10] Emission estimates for dust from constructing new roads are provided in ARB's Road Construction Dust methodology.[11]

EMISSION ESTIMATION METHODOLOGY

The AP-42 emission factor equation used to estimate paved road dust emissions in California is provided below, followed by a description of the inputs to the equation:[1]

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

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 (PM_{10} = 0.0022 lb/VMT),[1]
sL = the roadway-specific silt loading in grams/square meter (g/m^2),[2,3,4,5]
W = the average weight of vehicles traveling the road (California statewide default = 2.4 tons),[5]
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,[9] and
N = the number of days in the annual averaging period (default = 365)

ARB's database system maintains particulate emissions as Total PM (particulate emission greater than 10 microns) using ARB's speciation profile #471 for paved road dust (see Table 1, below), based on paved road dust sampling conducted in California and on evaluations conducted by ARB and MRI.[12-17]. It is estimated that PM_{10} is 45.72% of PM. Based on 2006 updates to ARB speciation profiles for $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter), $PM_{2.5}$ is estimated to be 6.86% of PM, or 15% of PM_{10}.[15]

$$\text{Total PM} = PM_{10}/0.4572$$

$$PM_{2.5} = [PM_{10} \times (0.0686/0.4572)]$$
$$= PM_{10} \times 15\%$$

Table 1. ARB Paved Road Dust Particulate Matter (PM)
Speciation Profile #471

Particulate Matter	Size	Fraction
PM10	< PM_{10}	0.4572
PM2.5	< $PM_{2.5}$	0.0686
PM	> PM_{10}	0.5428

Statewide PM_{10} and $PM_{2.5}$ emissions (tons/year) for 2012 are presented in Table 5, by county/air basin/air district (COABDIS) region, along with total VMT.

Roadway Category Splits

The HPMS, a federally mandated inventory system and planning tool designed to assess the nation's highway system, is used by State and Federal governments and local agencies to analyze the system's condition and performance. HPMS provides data on VMT for 12 functional systems, based on mobility and access considerations defined by the Federal Highway Administration (FHWA).[7,8] To calculate county-specific travel fractions for each roadway type, ARB apportioned 2008 Caltrans HPMS paved road VMT to four ARB roadway classifications (freeway, major, collector and local), based on their anticipated usage, modes of usage, and silt loading potential.[7] As available, ARB can incorporate more refined travel fraction data for COABDIS regions. Data for unspecified roads (canals, drainage ditches, etc.) are provided directly by air districts and counties. Table 2 shows how HPMS functional systems are distributed to ARB road categories and provides FWHA functional system characteristics. Table 6 presents total VMT (millions of miles) for 2012 for each COABDIS region, and the 2008 travel fractions used to distribute VMT to each roadway category.

Table 2. ARB Roadway Categories, Caltrans HPMS Functional Systems and FHWA Functional System Characteristics

ARB Category	**HPMS Functional System**	**FHWA Functional System Characteristics**
Systems for Rural Areas (populations < 5,000)		
Freeway	Interstate	All designated routes of the Interstate System. Provides substantial interstate travel, highest overall travel speeds.
Major	Other Principal Arterial	Non-interstate principal arterials
	Minor Arterials	Provides substantial statewide travel, links cities and larger towns, links to interstates and inter-county service; relatively high travel speeds.
Collector	Major Collector	Primarily intra-county; shorter distances and more moderate travel speeds than arterials.
Local	Minor Collector	Collects traffic from local roads, services smaller communities, links locally important traffic generators with remote areas.
	Local	Provides access to adjacent land over relatively short distances.
Systems for Urban Areas (populations ≥ 5,000)		
Freeway	Interstate, Other Freeway and Expressway	Highest level of mobility, highest traffic volumes and travel speeds, controlled access routes. Serves longest trips and through-movement as well as access to major urban centers. Provides intra-area travel, intra-urban and inter-city bus routes. Integrates with major rural connections.
Major	Other Principal Arterial	Provides service to major traffic movements, uncontrolled access to adjacent land.
	Minor Arterial	Interconnects, augments urban principal arterial system, distributes travel to smaller geographic areas, may carry local bus routes. Serves trips of moderate length at somewhat lower mobility and speeds. Connects to rural collector roads.
Collector	Collector	Provides land access, traffic circulation within residential neighborhoods, commercial and industrial areas. Connects to the arterial system.
Local	Local	Provides direct access to abutting land and higher order functional systems. Restricts through-movement, generally contains no bus routes.

Silt Loadings

ARB assigned silt loadings to four roadway types (freeway, major, collector, local), assuming that more highly traveled roadways with fewer entrance and exit points (limited access roadways such as freeways) have less silt loading compared to roadways with multiple access and exit points, and that roads with similar configurations and usage have similar silt loadings statewide. While ARB understands the limitations to this assumption, especially in computing localized emissions, our current strategy is to use the best available California roadway silt loading data to estimate regional entrained road dust emissions. Table 3, below, presents the statewide default silt loading values for the four ARB roadway categories, as well as the derivation of several district and county specific silt loadings. Silt loadings for unspecified roads were provided directly by air districts and counties. Table 7 presents silt loadings and associated PM_{10} emission factors, by roadway category, for each COABDIS region. A summary of the data used to develop the silt loadings may be found in Appendix A, Table 1. The basis for the proposed silt loading values is as follows:

<u>Statewide Default Silt Loadings</u>

- Freeway – U.S. EPA AP-42 (January 2011) default[1]
- Major and Collector roadways – geometric mean of 31 California-specific silt measurements of roads with high average daily traffic (ADT) conducted by MRI[2,5] and the University of California, Davis (UCD).[2,3,4]
- Local roadways – mean of eleven California-specific silt measurements of roads with low ADT conducted by MRI.[2,5]

<u>District and County Specific Silt Loadings</u>

- The San Joaquin Valley Air Pollution Control District (SJVAPCD) splits local roads into urban and rural classes and assigns separate silt loading values to each class. Local urban roads are assigned the statewide Local road default silt loading value. A higher silt loading value (derived from U.S. EPA AP-42 data) is assigned to local rural roads due to anticipated higher silt loading levels from agricultural activities.[2]
- For Major, Collector and Local roads, the portion of Los Angeles County in the South Coast Air Quality Management District (SCAQMD) and all portions of Orange, Riverside and San Bernardino counties use silt loading values based on subsets of measurements collected in the SCAQMD and Riverside County.[2,5]

Table 3. California Default Statewide and Local Silt Loading Values

Roadway Category	Silt Loading (sL) (g/m^2)	Source of sL Value
California Statewide Silt Loading Values		
Freeway	0.015	U.S. EPA default value[1]
Major	0.032	Geometric mean of 31 California samples[2,3,4,5]
Collector	0.032	Geometric mean of 31 California samples[2,3,4,5]
Local	0.32	Average of 11 California BACM samples[5]
District and County Specific Silt Loading Values		
District Specific - SJVAPCD[/a] Local Rural (PM_{10})	1.6	Average sL, AP-42 Local roads[1,2]
County Specific[/b] Major, Collector Los Angeles & Orange counties: $\text{Maj-Coll}_{[LA\&OR]}$ Riverside & San Bernardino counties: $\text{Maj-Coll}_{[RIV\&SB]}$ Major-Collector Scaling Ratio $\text{Maj-Coll}_{[RIV\&SB]}/\text{Maj-Coll}_{[LA\&OR]}$ Local Los Angeles & Orange counties: $\text{Local}_{[LA\&OR]}$ Riverside & San Bernardino counties: $\text{Local}_{[RIV\&SB]}$	0.013 0.08 (0.08/0.013) = 6.2 0.135 $\text{Local}_{[LA\&OR]}$ x 6.2 = $\text{Local}_{[RIV\&SB]}$ 0.135 x 6.2 = 0.84	0.013 = Mean of 3 of the 4 South Coast High ADT[/c] BACM[/d] sL measurements[2,5] 0.08 = Mean of all South Coast Low ADT BACM sL measurements[2,5] 6.2 is used below to scale sL $\text{Local}_{[LA\&OR]}$ to sL $\text{Local}_{[RIV\&SB]}$ 0.135 = Geometric mean of 11 CA High ADT sL measurements[5] $\text{Local}_{[LA\&OR]}$ scaled using ratio of $\text{Maj-Coll}_{[RIV\&SB]}/\text{Maj-Coll}_{[LA\&OR]}$[2,5]

a San Joaquin Valley Air Pollution Control District
b Silt loadings apply to the portion of Los Angeles County in the South Coast Air Quality Management District and all portions of Orange, Riverside, and San Bernardino counties
c ADT, Average Daily Traffic
d BACM, Best Available Control Measures

Vehicle Weight Estimates

The estimated statewide average vehicle weight is based on an informal traffic count conducted by MRI while performing California silt loading measurements.[2,5] The statewide default fleet vehicle weight is 2.4 tons; Table 7 contains fleet vehicle weights.

Activity Data: Vehicle Miles Traveled (VMT)

ARB developed both the paved road dust emissions inventory and the modeling inventory using 2012 VMT data from ARB's EMFAC2014 model and transportation planning agencies. VMT was distributed using 2008 travel fractions provided by Caltrans. VMT and travel fractions for each COABDIS are presented in Table 6; footnotes provide source information.

Paved Road PM Emissions Estimates

Table 5 presents uncontrolled paved road dust PM_{10} emissions (tons/year) for 2012, by paved road category within COABDIS region, except for SCAQMD Unspecified Roads, which reflect District controls. Table 7 presents PM_{10} emission factors (lbs $PM_{10}/10^6$ VMT) and roadway silt loadings (g/m^2), by COABDIS region.

Rainfall Adjustment

Table 8 shows the number of days per year that at least one site in each county, within air basin, received 0.01 inch or more of precipitation. The data are based on average annual days of precipitation per month over the years of record.

TEMPORAL ACTIVITY

Total annual entrained paved road dust emissions are allocated on a monthly basis. During the wet winter months, the relative contribution of paved road emissions is reduced compared to non-rainy months. Table 9 presents the temporal adjustments used to reflect seasonal rainfall patterns for each county, by air basin.

GROWTH FORECASTING

In the previous methodology, freeways and major roads were grown based on increases in roadway centerline mileage, and local and collector roads were grown based on increases in VMT.[18] For this update, based on discussions with U.S. EPA Region IX staff, growth for all four roadway categories is assumed to be proportional to changes in VMT.

ASSUMPTIONS AND LIMITATIONS

1. The current U.S. EPA AP-42 emission factor equation assumes that entrained paved road dust emissions are proportional to VMT, roadway silt loading, and average vehicle weight.
2. The methodology assumes that roadway silt loading varies by road type, quickly reaches an equilibrium condition, and is adequately characterized by a roadway-specific silt loading factor. Thus, the emission factor varies by the type of road.
3. The Major, Collector and Local roadway silt loadings are based on a total of 42 silt loading measurements collected from 1995 to 1997 in the South Coast Air Basin, Coachella Valley, Bakersfield and Sacramento. This does not fully represent the variability in California silt loading.
4. It is assumed that the U.S. EPA PM_{10} particle size multiplier (i.e., the 'k' factor in the AP-42 equation) reasonably represents the size distribution of California paved road dust.
5. ARB's speciation profile for entrained paved road dust is based on six measurements collected in the San Joaquin Valley and in Imperial and Mono counties and may not fully reflect the variability of particle size distributions throughout California.
6. The average vehicle fleet weight is assumed to be 2.4 tons statewide.
7. Caltrans HPMS VMT data by county for 2008 are assumed to accurately represent actual California roadway travel and thus the travel fractions for each roadway type.
8. It is assumed that the average annual number of days of precipitation $\geq$0.01 inch remains constant for each county, within air basin.
9. It is assumed that the temporal profile, based on county and air basin specific monthly rainfall, provides appropriate adjustments to allocate unpaved road dust emissions on a monthly basis.

CHANGES IN THE METHODOLOGY

There were substantial changes in the paved road dust emission estimates for this update. These include:

1. Incorporation of the U.S. EPA paved road emission factor equation from the Final Section of the Fifth Edition of U.S. EPA's AP-42 document (January 2011, Chapter 13.2.1).[1] Newly incorporated are:
    a. A revised PM_{10} emission factor equation based on regression analyses of 83 tests of emissions from public and industrial paved roads.
    b. The emissions testing included recent vintage light duty vehicles. The previous update was based on emissions testing of 1980's fleet vehicles.
    c. Elimination of brake wear, tire wear and exhaust (B/T/E) emissions from the emission factor equation. The previous update included B/T/E emissions, which

represented double-counting with the mobile inventory. For the new emission factor equation, B/T/E emissions were subtracted from total emissions prior to running the regressions.

   d. New exponents for the vehicle fleet weight and silt loading terms and revised PM_{10} particle size multiplier (“k” term, 0.0022 lbs PM_{10}/VMT)
   e. A precipitation adjustment factor (1-P/4N) to reflect the dust suppression effects of days with $\geq$ 0.01 inch precipitation.

2. Estimates of paved road dust $PM_{2.5}$ emissions are presented for the first time, calculated using ARB’s particle speciation profile #471. In 2006, ARB updated the paved road dust $PM_{2.5}/PM_{10}$ particle size fraction from 16.9% to 15%.[15]
3. Incorporation of a revised statewide silt loading value of 0.032 g/m^2 for the Major and Collector roadway categories, based on the geometric mean of 31 silt loading measurements collected between 1995-1997 on roadways with high ADT in the Coachella Valley, Bakersfield, Riverside, Sacramento and the South Coast air basin.[2,3,4,5] For Major, Collector and Local roads, the portion of Los Angeles County in the SCAQMD and all portions of Orange, Riverside and San Bernardino counties use silt loading values based on subsets of the measurements in the SCAQMD and Riverside.[2,5] SJVAPCD separates Local roads into local urban and local rural roads and uses the statewide default silt loading value for local urban roads. The District assumes that agricultural activities generate a higher silt loading potential for local rural roads and assigns a value based on an average of U.S. EPA AP-42 silt loading values for Local roads.[1,2]
4. Updated VMT data based on EMFAC2014 and transportation planning agencies’ reports of annualized VMT per average weekday for the year 2012.[6]
5. Updated fractions of vehicle miles traveled on Freeway, Major, Collector, and Local roads (travel fractions) to reflect 2008 Caltrans HPMS data.[7,8]
6. Incorporating temporal adjustments to reflect county specific rainfall patterns, by air basin.[9]
7. Revised assumptions that growth for freeways, major, collector and local roads is proportional to changes in VMT.

The above changes reduced statewide PM_{10} emissions for entrained paved road dust by about 22% from the previous 2013 published inventory estimates.[19]

COMMENTS AND RECOMMENDATIONS

Research is ongoing to better understand and quantify paved road dust emissions, with recent studies employing mobile monitoring technologies.[20,21] When available, the studies will be evaluated and incorporated as appropriate into this methodology. Effort is also needed to better account for the variability in dust emissions based on population density, adjacent land uses, and geographic location.

Silt Loading. This methodology assumes that silt loading values vary by roadway type. Additional research is needed to fully characterize the relationship between roadway type and silt loading values. Also, additional county-specific silt loading measurements are needed to more accurately reflect the variability of silt loading throughout California.

Fleet Vehicle Weight. Based on a 1995 informal traffic count conducted by MRI, the average fleet vehicle weight is assumed to be 2.4 tons.[2,5] This value should be re-evaluated to ensure accurate average vehicle fleet weights are used to estimate dust emissions. Since the vehicle distribution among regions may vary, the evaluation should consider developing county-specific average weights.

Calculating Paved Road $PM_{2.5}$. The Final Section of the U. S. EPA's January 2011 AP-42 for paved roads assigns a particle size fraction of 25% to $PM_{2.5}$ ($PM_{2.5} = PM_{10}$ x 25%).[1] This fraction is based on test conditions that include heavy vehicles traveling at very slow speeds (less than 5 mph) at corn processing facilities in the Midwest, and are not representative of typical travel on public and industrial paved roads in California. The January 2011 $PM_{2.5}$ fraction is 60% greater than the $PM_{2.5}$ particle size fraction of 15% used in the previous update of AP-42.

For this update, paved road $PM_{2.5}$ is calculated using ARB speciation profile #471, which was derived from testing conducted in the San Joaquin Valley and in Imperial and Mono counties.[12,13,14] ARB updated their $PM_{2.5}$ fugitive dust profiles in 2006, after a review of recent Western Regional Air Partnership (WRAP) studies and ARB's emission inventory vs. ambient air quality measurement data indicated that $PM_{2.5}$ from these sources was overestimated in California.[15-17,22] The paved road $PM_{2.5}/PM_{10}$ fraction was updated from 16.9% to 15% to more accurately reflect measured $PM_{2.5}$ emissions.[15]

Temporal Profiles. The previous update applied a single temporal profile statewide.[2] In 2001, under the sponsorship of the Central California Ozone Study (CCOS), researchers developed temporal profiles for a number of area and off-road emission sources, including paved roads.[23,24] On a statewide basis, the temporal profile proposed by the CCOS study allocated an average of up to 75% of annual emissions to the summer months. However, full documentation was not provided for their derivation and ARB could not re-create the results. Based on newer research that shows minimal seasonal variation for paved road dust emissions, ARB developed relatively flat monthly allocations of annual paved road dust emissions for this update.[25-27] The new temporal profiles (Table 9) are calculated using county-specific records, within air basin, for monthly days of rain (Table 8).[9]

SAMPLE CALCULATIONS

The steps below summarize the data computations necessary to estimate the annual tons of paved road dust PM_{10} emissions in Santa Cruz County. Sample emissions calculation values are provided below in Table 4.

Step 1: Travel Fractions. From Table 5, enter the road-specific travel fractions.

Step 2: VMT. From Table 5, enter total 2012 VMT. Calculate VMT for each road category by multiplying total VMT by the associated travel fraction.

Total VMT x Travel Fraction = Road Category VMT

Step 3: Emission Factor. From Table 7, enter the emission factor for each road type. Emission factors (E, lbs $PM_{10}/10^6$ VMT/year) were calculated using the U.S. EPA AP-42 PM_{10} emission factor equation shown below, with k = 0.0022 lb PM_{10}/VMT, roadway silt loadings (sL) and default average vehicle weight (W) of 2.4 tons from Table 7, 65 days of annual rainfall (P) from Table 8, and 365 days/year (N).

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

Step 4: Multiply each emission factor from Step 3 by the VMT data from Step 2 to compute annual pounds of PM_{10} emissions for each road type; divide by 2000 to calculate the annual tons of PM_{10}/year from paved road dust for each roadway type. Sum roadway emissions for total paved road dust emissions.

(*E x VMT)/2000 = tons/year PM_{10} Road Emissions*

Step 5: Calculate $PM_{2.5}$ emissions using particle size fractions for ARB's speciation profile #471, shown in Table 1:

Tons/year $PM_{2.5}$ = Tons/year PM_{10} x Fraction(<PM2.5/<PM10)

= Tons/year PM_{10} x (0.0686/0.4572)

Table 4. Estimating Paved Road Dust Emissions in Santa Cruz County[/a]

Steps	Values	Source	ARB Roadway Category				Totals
			Freeway	Major	Collector	Local	
1	Travel Fractions	Table 6	0.271	0.476	0.187	0.066	1
2	2012 VMT (*million/yr)*	Table 5	412.73	724.95	284.80	100.52	1,523
3	Emission Factor PM_{10} *(lbs PM_{10}/million VMT)*	Table 6	112.40	223.95	223.95	1,820.30	
4	PM_{10} Emissions, *tons/yr*	Calculation	23.20	81.16	31.88	91.49	228
5	$PM_{2.5}$ Emissions, *tons/yr*	Table 1	3.48	12.17	4.78	13.72	34.20

a Table 7 emission factors are rounded from raw data; calculated emissions in Table 4 will differ slightly from emissions shown in Table 5.

ADDITIONAL CODES

SOURCE CATEGORY GROWTH AND CONTROL CODES

Various

SOURCE CATEGORY CODE POLLUTANT SPECIATION PROFILES

For All: PM_{10} = 471, VOC = not applicable

SOURCE CATEGORY CODE REACTIVITY FACTORS

Not Applicable

PREPARED BY

Janet Spencer
April 2014

REVISED BY

Janet Spencer
November 2016

Updated statewide emissions to reflect 2012 VMT from EMFAC2014 and transportation planning agencies. Minor editorial changes.

REFERENCES

1. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emissions Factors, AP-42, Section 13.2.1, Paved Roads. January 2011. http://www.epa.gov/ttn/chief/ap42/ch13/index.html
2. Gaffney, P. Entrained Dust from Paved Road Travel, Emission Estimation Methodology Background Document. California Air Resources Board. July 1997. http://www.arb.ca.gov/ei/areasrc/arbmiscprocpaverddstbkgrnd.pdf
3. Ashbaugh, L., Flocchini, R., et al. Final Report, Traffic Generated PM_{10} “Hot Spots”. Prepared for Caltrans by the Air Quality Group, Crocker Nuclear Laboratory, University of California, Davis, Contract Number 53V606 A2, August, 1996. http://aqp.engr.ucdavis.edu/Documents/1996-Ashbaugh-UCDCaltrans.pdf
4. Ashbaugh, L., Flocchini, R., et al. Final Report, Wintertime Traffic Generated PM_{10} “Hot Spots”. Prepared for Caltrans by the Air Quality Group, Crocker Nuclear Laboratory, University of California, Davis, Contract Number 43X878, September 3, 1998. http://aqp.engr.ucdavis.edu/Documents/pm10_hotspot_Sunrise.pdf
5. Muleski, G. Improvement of Specific Emission Factors (BACM Project No. 1), Final Report. Midwest Research Institute, March 29, 1996.
6. EMFAC2014, Version 1.06. 2012 Default Statewide Vehicle Miles Traveled (VMT) by County/Air Basin, per Average Weekday.
7. California Department of Transportation. Highway Performance Monitoring System (HPMS) Vehicle Miles Traveled (VMT) per Day by County and Roadway Functional Classification for 2008. Excel file provided by Brian Domsic, June 10, 2009.
8. U.S. Department of Transportation, Federal Highway Administration, FHWA Functional Classification Guidelines. April 2000. http://www.fhwa.dot.gov/planning/processes/statewide/related/functional_classification/fc02.cfm
9. Western Regional Climate Center, Average Number of Days per Month with Rainfall of 0.01 Inch or Greater, by County/Air Basin, for Years of Record. http://www.wrcc.dri.edu/ Accessed May 8, 2009
10. California Air Resources Board, EMFAC Web Database. https://www.arb.ca.gov/emfac/
11. Gaffney, P. Emission Estimation Methodology Section 7.8, Road Construction Dust, California Air Resources Board. August 1997. http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-8.pdf
12. California Air Resources Board, Speciation Profiles Used in ARB Modeling. http://www.arb.ca.gov/ei/speciate/dnldoptvv10001.php#specprof
13. Houck, J.E., Chow, J.C., Watson, J.G., et al. Determination of Particle Size Distribution and Chemical Composition of Particulate Matter from Selected Sources in California, Final Report. Desert Research Institute & OMNI Environmental. Prepared for California Air Resources Board. Agreement No. A6-175-32. June 30, 1989. http://www.arb.ca.gov/ei/speciate/r01t20/rf20doc/refnum20.htm

14. Chow, J.C., Watson, J.G., Ashbaugh, L.L., Magliano, K.L. 2003. Similarities and differences in PM_{10} chemical source profiles for geological dust from the San Joaquin Valley, California. Atmospheric Environment 37:1317-1340. 2003. http://www.arb.ca.gov/ei/speciate/r01t20/rf13doc/Ref%2013%20-%20Chowetal2003AESJVFugDustProfiles.pdf

15. Gaffney, P. Updating the ARB PM2.5 Size Speciation Profiles for Fugitive Dust Sources. California Air Resources Board. August 2006.

16. Countess Environmental. Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, prepared for the Western Governors' Association, WGA Contract No. 30204-111. September 7, 2006. http://www.wrapair.org/forums/dejf/fdh/index.html

17. Cowherd, C. Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors. Prepared by Midwest Research Institute for Western Governors' Association, Western Regional Air Partnership. MRI Project No. 110397. Finalized Nov. 1, 2006 http://www.epa.gov/ttnchie1/ap42/ch13/bgdocs/b13s02.pdf

18. Gaffney, P. Emission Estimation Methodology Section 7.9, Entrained Paved Road Dust. California Air Resources Board. July 1997. http://www.arb.ca.gov/ei/areasrc/arbmiscprocpaverddst.htm

19. California Air Resources Board, California Emissions and Air Quality, 2013 Edition. https://www.arb.ca.gov/aqd/almanac/almanac.htm

20. Cowherd, C., Technical Support Document for Mobile Monitoring Technologies. Midwest Research Institute. Prepared for Rodney Langston and Russell S. Merle, Jr., Clark County Department of Air Quality and Environmental Management, Las Vegas, NV. Jan. 2009. http://www.epa.gov/ttnchie1/ap42/ch13/related/Mobile_Monitoring_TSD_010909.pdf

21. Langston, R., Merle, R. S., Jr. Clark County (Nevada) Paved Road Dust Emission Studies in Support of Mobile Monitoring Technologies. Clark County Department of Air Quality and Environmental Management (DAQEM). December 22, 2008. http://www.epa.gov/ttnchie1/ap42/ch13/related/Final_Test_Report.pdf

22. Cowherd, C., Donaldson, J. Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust, Final Report. October 12, 2005. Prepared by Midwest Research Institute for the Western Governors' Association, Western Regional Air Partnership. MRI Project No. 110397. http://www.wrapair.org/forums/dejf/documents/fffd/Final_Fine_Fraction_Dust_Report.pdf

23. California Air Resources Board. Central California Air Quality Studies. http://www.arb.ca.gov/airways/

24. Sonoma Technology, Inc. Revised Temporal Allocation Factors for Area and Off-Road Emissions Sources. Technical Memorandum of Sept. 26, 2001, STI Ref. No. 900201. http://www.arb.ca.gov/ei/areasrc/temporalprofile010926.pdf

25. Mid-Atlantic Regional Air Management Association, Inc. (MARAMA). Paved Road Area Source Category Calculation Methodology Sheet. December 20, 2004. http://www.marama.org/visibility/Calculation_Sheets/index.htm

26. Kuhns, H., Etyemezian, V., Green, M., et al. Vehicle-based road dust emission measurement – Part II: Effect of precipitation, wintertime road sanding, and street sweepers on inferred PM_{10} emission potentials from paved and unpaved roads. *Atmospheric Environment* Vol. 37, Issue 32 (2003) 4573-4582. http://www.sciencedirect.com/science/article/pii/S1352231003005296

27. ENVIRON International Corp. WRAP Mobile Source Emission Inventories Update, Final Report. Prepared for the Western Governors' Association. May 2006. http://www.swcleanair.org/gorgedata/WRAP_MobileSourceEI.pdf

Table 5
2012 Entrained Road Dust Emissions for PM10 and PM2.5

Air Basin	County	Air District	2012 VMT (million VMT per year)	2012 Paved Road Dust PM_{10} Emissions, tons/year						2012 PM2.5 Emissions (tons/year) (1)
				Freeway	Major	Collector	Local, Local Urban (2)	Local Rural (3) Sand/Gravel Proc. (4)	Total	Total
GB	Alpine	GBU	67	0.00	5.75	0.88	6.44		13	1.96
GB	Inyo	GBU	555	0.07	47.37	9.96	51.28		109	16.30
GB	Mono	GBU	314	0.00	27.77	3.05	40.37		71	10.68
LC	Lake	LAK	510	0.00	34.72	15.82	52.17		103	15.41
LT	El Dorado	ED	387	3.78	24.69	5.63	43.44		78	11.63
LT	Placer	PLA	312	7.10	13.22	3.91	27.47		52	7.76
MC	Amador	AMA	443	0.00	37.87	6.91	39.35		84	12.62
MC	Calaveras	CAL	369	0.00	28.26	7.65	41.95		78	11.68
MC	El Dorado	ED	1,384	13.54	88.53	20.17	155.75		278	41.70
MC	Mariposa	MPA	177	0.00	9.65	1.48	70.25		81	12.21
MC	Nevada	NSI	1,050	25.41	30.31	19.41	127.09		202	30.33
MC	Placer	PLA	556	12.69	23.63	6.99	49.09		92	13.86
MC	Plumas	NSI	259	0.00	14.93	7.85	48.85		72	10.74
MC	Sierra	NSI	90	0.70	4.33	1.52	22.04		29	4.29
MC	Tuolumne	TUO	387	0.00	25.24	10.67	60.30		96	14.43
MD	Kern	KER	1,666	25.83	107.88	15.66	138.17		288	43.13
MD	Los Angeles	AV	3,466	90.86	176.54	21.57	165.12		454	68.11
MD	Riverside	MOJ	392	10.91	34.84	13.14	56.27		115	17.27
MD	Riverside	SC	425	11.83	37.77	14.25	61.00		125	18.73
MD	San Bernardino	MOJ	8,814	267.22	794.95	161.97	1,338.98		2,563	384.47
NC	Del Norte	NCU	224	0.00	15.95	5.53	22.87		44	6.65
NC	Humboldt	NCU	1,111	13.30	59.30	20.89	103.03		197	29.48
NC	Mendocino	MEN	1,020	3.44	65.92	24.31	106.00		200	29.95
NC	Sonoma	NS	716	10.32	37.44	14.74	56.05		119	17.78
NC	Trinity	NCU	200	0.00	15.71	1.81	36.91		54	8.17
NCC	Monterey	MBU	3,620	33.59	233.54	66.76	333.67		668	100.13
NCC	San Benito	MBU	686	0.00	66.22	6.38	40.56		113	16.97
NCC	Santa Cruz	MBU	1,523	23.18	81.09	31.95	91.68		228	34.18
NEP	Lassen	LAS	374	0.00	24.68	10.75	53.65		89	13.36
NEP	Modoc	MOD	134	0.00	6.74	3.33	39.00		49	7.36
NEP	Siskiyou	SIS	1,000	24.89	24.53	13.27	179.08		242	36.27
SC	Los Angeles	SC	78,066	2,032.35	1,739.72	212.52	1,740.69	264.20	5,989	898.42
SC	Orange	SC	27,160	754.03	590.05	37.41	705.68	78.06	2,165	324.78
SC	Riverside	SC	18,207	500.11	1,597.31	602.46	2,579.63	138.10	5,418	812.64
SC	San Bernardino	SC	14,487	433.72	1,290.29	262.89	2,173.30	120.09	4,280	642.04
SCC	San Luis Obispo	SLO	2,761	33.21	192.19	27.16	233.99		487	72.98
SCC	Santa Barbara	SB	3,304	56.27	189.36	47.52	211.58		505	75.71
SCC	Ventura	VEN	7,191	153.14	386.59	67.83	530.49		1,138	170.71
SD	San Diego	SD	30,297	956.62	1,098.66	276.47	1,357.82		3,690	553.44

1 $PM_{2.5}$ emissions are calculated from entrained paved road emissions for PM_{10} using particle size fractions from ARB speciation profile 471: $PM_{2.5} = PM_{10} \times (0.0686/0.4572)$. See http://www.arb.ca.gov/ei/speciate/dnldopt.htm#specprof
2 SJU District (San Joaquin Valley Air Pollution Control District): Local emissions include only Local Urban roadways.
3 The SJU District splits local roads into urban and rural classes, and uses separate silt loading values. Due to anticipated higher silt loading levels, a higher silt loading value derived from AP-42 data is used in computing emissions for local rural roads (Rural Streets, EIC 640-643-5400-0000).
4 SC District (South Coast Air Quality Management District, SCAQMD) provided controlled emissions from paved roads at sand and gravel processing facilities (Unspecified Paved Roads, EIC 640-636-5400-0000).

Table 5
2012 Entrained Road Dust Emissions for PM10 and PM2.5

Air Basin	County	Air District	2012 VMT (million VMT per year)	2012 Paved Road Dust PM_{10} Emissions, tons/year						2012 PM2.5 Emissions (tons/year) (1)
				Freeway	Major	Collector	Local, Local Urban (2)	Local Rural (3) Sand/Gravel Proc. (4)	Total	Total
SF	Alameda	BA	13,732	438.13	488.91	98.79	660.76		1,687	252.99
SF	Contra Costa	BA	7,985	232.84	299.85	59.56	600.87		1,193	178.97
SF	Marin	BA	2,258	63.02	73.30	36.86	137.89		311	46.66
SF	Napa	BA	1,101	11.11	64.47	25.07	91.77		192	28.86
SF	San Francisco	BA	3,159	63.82	183.53	23.93	151.31		423	63.39
SF	San Mateo	BA	5,595	177.70	200.81	39.35	280.51		698	104.76
SF	Santa Clara	BA	14,041	342.59	706.41	84.29	812.72		1,946	291.90
SF	Solano	BA	2,891	102.69	81.78	19.79	163.13		367	55.11
SF	Sonoma	BA	3,047	44.09	159.93	62.96	239.45		506	75.96
SJV	Fresno	SJU	8,641	144.11	419.25	123.56	678.73	2,389.79	3,755	563.32
SJV	Kern	SJU	6,872	105.59	441.04	64.02	423.31	612.38	1,646	246.95
SJV	Kings	SJU	1,408	21.25	80.78	23.21	82.57	146.47	354	53.14
SJV	Madera	SJU	1,854	14.72	136.91	21.08	69.78	519.83	762	114.35
SJV	Merced	SJU	2,575	35.68	153.45	36.35	122.90	534.60	883	132.45
SJV	San Joaquin	SJU	6,485	167.48	256.58	85.56	341.98	472.49	1,324	198.61
SJV	Stanislaus	SJU	3,769	64.19	159.89	97.34	260.58	306.61	889	133.29
SJV	Tulare	SJU	3,777	32.89	234.76	74.16	205.75	1,081.40	1,629	244.34
SS	Imperial	IMP	2,400	38.24	126.44	46.75	241.40		453	67.92
SS	Riverside	SC	4,714	131.03	418.49	157.84	675.86		1,383	207.48
SV	Butte	BUT	1,693	7.57	105.69	45.55	190.67		349	52.42
SV	Colusa	COL	696	23.96	13.10	6.05	93.82		137	20.54
SV	Glenn	GLE	527	16.03	12.35	7.16	61.89		97	14.61
SV	Placer	PLA	3,110	71.28	132.72	39.26	275.75		519	77.85
SV	Sacramento (4)	SAC	13,027	345.20	570.67	110.47	796.54		1,823	273.43
SV	Shasta	SHA	1,923	44.73	85.24	19.13	156.23		305	45.80
SV	Solano	YS	1,660	58.81	46.83	11.33	93.42		210	31.56
SV	Sutter	FR	798	3.91	55.74	11.41	112.13		183	27.48
SV	Tehama	TEH	1,065	29.35	31.35	17.59	92.11		170	25.56
SV	Yolo	YS	2,167	68.64	61.52	21.03	199.23		350	52.56
SV	Yuba	FR	658	6.10	37.13	16.25	66.59		126	18.91
Statewide Totals			**337,329**	**8,405**	**15,122**	**3,568**	**21,571**	**6,664**	**55,330**	**8,300**

1 $PM_{2.5}$ emissions are calculated from entrained paved road emissions for PM_{10} using particle size fractions from ARB speciation profile 471: $PM_{2.5} = PM_{10} \times (0.0686/0.4572)$. See http://www.arb.ca.gov/ei/speciate/dnldopt.htm#specprof
2 SJU District (San Joaquin Valley Air Pollution Control District): Local emissions include only Local Urban roadways.
3 The SJU District splits local roads into urban and rural classes, and uses separate silt loading values. Due to anticipated higher silt loading levels, a higher silt loading value derived from AP-42 data is used in computing emissions for local rural roads (Rural Streets, EIC 640-643-5400-0000).
4 SC District (South Coast Air Quality Management District, SCAQMD) provided controlled emissions from paved roads at sand and gravel processing facilities (Unspecified Paved Roads, EIC 640-636-5400-0000).

Table 6
2008 Roadway Travel Fractions and VMT (1) Estimates
for California Entrained Paved Road Dust

Air Basin	County	Air District	2012 VMT (million VMT per year)	2008 HPMS Travel Fractions (2)				
				Freeway	Major	Collector	Local, Local Urban (3)	Local Rural
GB	Alpine	GBU	67	0.000	0.775	0.118	0.107	
GB	Inyo	GBU	555	0.002	0.743	0.156	0.099	
GB	Mono	GBU	314	0.000	0.776	0.085	0.139	
LC	Lake	LAK	510	0.000	0.610	0.278	0.113	
LT	El Dorado	ED	387	0.174	0.572	0.130	0.124	
LT	Placer	PLA	312	0.408	0.381	0.113	0.097	
MC	Amador	AMA	443	0.000	0.763	0.139	0.098	
MC	Calaveras	CAL	369	0.000	0.688	0.186	0.126	
MC	El Dorado	ED	1,384	0.174	0.572	0.130	0.124	
MC	Mariposa	MPA	177	0.000	0.488	0.075	0.437	
MC	Nevada	NSI	1,050	0.437	0.261	0.167	0.135	
MC	Placer	PLA	556	0.408	0.381	0.113	0.097	
MC	Plumas	NSI	259	0.000	0.519	0.273	0.209	
MC	Sierra	NSI	90	0.140	0.435	0.153	0.272	
MC	Tuolumne	TUO	387	0.000	0.583	0.246	0.171	
MD	Kern	KER	1,666	0.268	0.562	0.082	0.089	
MD	Los Angeles	AV	3,466	0.453	0.442	0.054	0.051	
MD	Riverside	MOJ	392	0.478	0.333	0.126	0.063	
MD	Riverside	SC	425	0.478	0.333	0.126	0.063	
MD	San Bernardino	MOJ	8,814	0.524	0.340	0.069	0.067	
NC	Del Norte	NCU	224	0.000	0.657	0.227	0.116	
NC	Humboldt	NCU	1,111	0.222	0.497	0.175	0.106	
NC	Mendocino	MEN	1,020	0.062	0.599	0.221	0.118	
NC	Sonoma	NS	716	0.258	0.470	0.185	0.087	
NC	Trinity	NCU	200	0.000	0.712	0.082	0.206	
NCC	Monterey	MBU	3,620	0.164	0.572	0.164	0.101	
NCC	San Benito	MBU	686	0.000	0.853	0.082	0.064	
NCC	Santa Cruz	MBU	1,523	0.271	0.476	0.187	0.066	
NEP	Lassen	LAS	374	0.000	0.587	0.256	0.157	
NEP	Modoc	MOD	134	0.000	0.453	0.224	0.323	
NEP	Siskiyou	SIS	1,000	0.453	0.224	0.121	0.201	
SC	Los Angeles	SC	78,066	0.453	0.442	0.054	0.051	
SC	Orange	SC	27,160	0.483	0.431	0.027	0.059	
SC	Riverside	SC	18,207	0.478	0.333	0.126	0.063	
SC	San Bernardino	SC	14,487	0.524	0.340	0.069	0.067	
SCC	San Luis Obispo	SLO	2,761	0.211	0.611	0.086	0.092	
SCC	Santa Barbara	SB	3,304	0.299	0.505	0.127	0.069	
SCC	Ventura	VEN	7,191	0.370	0.469	0.082	0.079	
SD	San Diego	SD	30,297	0.553	0.319	0.080	0.048	
SF	Alameda	BA	13,732	0.566	0.317	0.064	0.053	
SF	Contra Costa	BA	7,985	0.517	0.334	0.066	0.082	
SF	Marin	BA	2,258	0.497	0.290	0.146	0.067	
SF	Napa	BA	1,101	0.180	0.524	0.204	0.092	
SF	San Francisco	BA	3,159	0.360	0.520	0.068	0.053	
SF	San Mateo	BA	5,595	0.563	0.319	0.063	0.055	
SF	Santa Clara	BA	14,041	0.434	0.449	0.054	0.064	
SF	Solano	BA	2,891	0.627	0.251	0.061	0.062	
SF	Sonoma	BA	3,047	0.258	0.470	0.185	0.087	

1 2012 VMT from EMFAC2014 or provided by regional transportation planning agencies. Does not include VMT on unspecified roads, e.g., sand and gravel processing facilities.
2 Sacramento Area Council of Governments (SACOG) provided 2008 travel fractions for Sacramento County.
3 SJU District distributes Local Roads VMT to Local Urban and Local Rural fractions. For all other regions, the Local Roads fraction includes both Local Urban and Local Rural VMT.

Table 6
2008 Roadway Travel Fractions and VMT (1) Estimates for California Entrained Paved Road Dust

Air Basin	County	Air District	2012 VMT (million VMT per year)	2008 HPMS Travel Fractions (2)				
				Freeway	Major	Collector	Local, Local Urban (3)	Local Rural
SJV	Fresno	SJU	8,641	0.293	0.427	0.126	0.085	0.022
SJV	Kern	SJU	6,872	0.268	0.562	0.082	0.066	0.026
SJV	Kings	SJU	1,408	0.264	0.503	0.144	0.063	0.070
SJV	Madera	SJU	1,854	0.139	0.650	0.100	0.041	0.052
SJV	Merced	SJU	2,575	0.244	0.527	0.125	0.052	0.018
SJV	San Joaquin	SJU	6,485	0.456	0.351	0.117	0.058	0.020
SJV	Stanislaus	SJU	3,769	0.300	0.375	0.229	0.075	0.071
SJV	Tulare	SJU	3,777	0.152	0.545	0.172	0.059	0.022
SS	Imperial	IMP	2,400	0.273	0.453	0.168	0.106	
SS	Riverside	SC	4,714	0.478	0.333	0.126	0.063	
SV	Butte	BUT	1,693	0.080	0.557	0.240	0.124	
SV	Colusa	COL	696	0.609	0.167	0.077	0.147	
SV	Glenn	GLE	527	0.541	0.209	0.121	0.129	
SV	Placer	PLA	3,110	0.408	0.381	0.113	0.097	
SV	Sacramento (4)	SAC	13,027	0.469	0.389	0.075	0.067	
SV	Shasta	SHA	1,923	0.419	0.401	0.090	0.090	
SV	Solano	YS	1,660	0.627	0.251	0.061	0.062	
SV	Sutter	FR	798	0.088	0.628	0.129	0.155	
SV	Tehama	TEH	1,065	0.492	0.264	0.148	0.095	
SV	Yolo	YS	2,167	0.561	0.252	0.086	0.101	
SV	Yuba	FR	658	0.165	0.503	0.220	0.111	
Statewide Total			**337,329**					

1 2012 VMT from EMFAC2014 or provided by regional transportation planning agencies. Does not include VMT on unspecified roads, e.g., sand and gravel processing facilities.
2 Sacramento Area Council of Governments (SACOG) provided 2008 travel fractions for Sacramento County.
3 SJU District distributes Local Roads VMT to Local Urban and Local Rural fractions. For all other regions, the Local Roads fraction includes both Local Urban and Local Rural VMT.

Table 7
2008 Silt Loadings and PM_{10} Emission Factors for California Entrained Paved Road Dust Estimates

Air Basin	County	Air District	Silt Loadings (SL, g/m^2) and PM_{10} Emission Factors (EF; lbs PM_{10}/10^6 VMT)										Avg. Vehicle Weight (tons)
			Freeway		Major (1)		Collector (1)		Local, Local Urban (1,2)		Local Rural (2) Sand/Gravel Proc. (3)		
			SL	EF	SL	EF	SL	EF	SL	EF	SL	EF	
GB	Alpine	GBU	0.015	111.8	0.032	222.8	0.032	222.8	0.32	1,811.2			2.4
GB	Inyo	GBU	0.015	115.4	0.032	229.9	0.032	229.9	0.32	1,868.6			2.4
GB	Mono	GBU	0.015	114.5	0.032	228.1	0.032	228.1	0.32	1,854.2			2.4
LC	Lake	LAK	0.015	112.1	0.032	223.5	0.032	223.5	0.32	1,816.4			2.4
LT	El Dorado	ED	0.015	112.1	0.032	223.5	0.032	223.5	0.32	1,816.4			2.4
LT	Placer	PLA	0.015	111.4	0.032	222.0	0.032	222.0	0.32	1,804.7			2.4
MC	Amador	AMA	0.015	112.5	0.032	224.1	0.032	224.1	0.32	1,821.6			2.4
MC	Calaveras	CAL	0.015	111.8	0.032	222.8	0.032	222.8	0.32	1,811.2			2.4
MC	El Dorado	ED	0.015	112.3	0.080	223.8	0.080	223.8	0.84	1,819.0			2.4
MC	Mariposa	MPA	0.015	112.1	0.080	223.3	0.080	223.3	0.84	1,815.1			2.4
MC	Nevada	NSI	0.015	110.9	0.080	221.1	0.080	221.1	0.84	1,796.8			2.4
MC	Placer	PLA	0.015	111.7	0.032	222.7	0.032	222.7	0.32	1,809.9			2.4
MC	Plumas	NSI	0.015	111.6	0.032	222.3	0.032	222.3	0.32	1,807.3			2.4
MC	Sierra	NSI	0.015	111.3	0.032	221.7	0.032	221.7	0.32	1,802.0			2.4
MC	Tuolumne	TUO	0.015	112.4	0.032	223.9	0.032	223.9	0.32	1,820.3			2.4
MD	Kern	KER	0.015	115.7	0.032	230.5	0.032	230.5	0.32	1,873.8			2.4
MD	Los Angeles	AV	0.015	115.7	0.032	230.5	0.032	230.5	0.32	1,873.8			2.4
MD	Riverside	MOJ	0.015	116.3	0.032	533.3	0.032	533.3	0.32	4,531.5			2.4
MD	Riverside	SC	0.015	116.3	0.032	533.3	0.032	533.3	0.32	4,531.5			2.4
MD	San Bernardino	MOJ	0.015	115.8	0.032	531.1	0.032	531.1	0.32	4,512.7			2.4
NC	Del Norte	NCU	0.015	108.7	0.032	216.6	0.032	216.6	0.32	1,760.3			2.4
NC	Humboldt	NCU	0.015	107.9	0.032	215.0	0.032	215.0	0.32	1,747.2			2.4
NC	Mendocino	MEN	0.015	108.4	0.032	215.9	0.032	215.9	0.32	1,755.1			2.4
NC	Sonoma	NS	0.015	111.6	0.032	222.3	0.032	222.3	0.32	1,807.3			2.4
NC	Trinity	NCU	0.015	110.9	0.032	220.9	0.032	220.9	0.32	1,795.5			2.4
NCC	Monterey	MBU	0.015	113.2	0.032	225.6	0.032	225.6	0.32	1,833.4			2.4
NCC	San Benito	MBU	0.015	113.5	0.032	226.2	0.032	226.2	0.32	1,838.6			2.4
NCC	Santa Cruz	MBU	0.015	112.4	0.032	223.9	0.032	223.9	0.32	1,820.3			2.4
NEP	Lassen	LAS	0.015	112.9	0.032	224.9	0.032	224.9	0.32	1,828.1			2.4
NEP	Modoc	MOD	0.015	111.5	0.032	222.2	0.032	222.2	0.32	1,806.0			2.4
NEP	Siskiyou	SIS	0.015	109.9	0.032	219.0	0.032	219.0	0.32	1,779.9			2.4
SC	Los Angeles	SC	0.015	114.9	0.032	100.9	0.032	100.9	0.32	877.0			2.4
SC	Orange	SC	0.015	115.0	0.032	100.9	0.032	100.9	0.32	877.6			2.4
SC	Riverside	SC	0.015	114.9	0.032	527.0	0.032	527.0	0.32	4,478.2			2.4
SC	San Bernardino	SC	0.015	114.3	0.032	524.4	0.032	524.4	0.32	4,456.2			2.4
SCC	San Luis Obispo	SLO	0.015	114.2	0.032	227.6	0.032	227.6	0.32	1,850.3			2.4
SCC	Santa Barbara	SB	0.015	113.9	0.032	227.0	0.032	227.0	0.32	1,845.1			2.4
SCC	Ventura	VEN	0.015	115.1	0.032	229.4	0.032	229.4	0.32	1,864.7			2.4
SD	San Diego	SD	0.015	114.2	0.032	227.6	0.032	227.6	0.32	1,850.3			2.4

1 For Major, Collector and Local roads, the portion of Los Angeles County in the SC Air District (South Coast Air Quality Management District, SCAQMD) and all portions of Orange, Riverside and San Bernardino counties use silt loading values derived from a subset of measurements collected in the SCAQMD and Riverside County. Silt loading measurements used for this update are presented in Appendix A, Table 1. See Table 3 for more information on how silt loading values were derived.

2 The SJU District (San Joaquin Valley Air Pollution Control District) splits local roads into urban and rural classes and uses separate silt loading values. A higher silt loading value derived from AP-42 data is used to compute emissions for local rural roads due to anticipated higher loading levels.

3 SCAQMD provides ARB with only the total PM_{10} emissions for paved roads at sand and gravel processing facilities.

4 Sacramento Area Council of Governments (SACOG) provided 2008 travel fractions for Sacramento County.

Table 7
2008 Silt Loadings and PM_{10} Emission Factors for California Entrained Paved Road Dust Estimates

			Silt Loadings (SL, g/m^2) and PM_{10} Emission Factors (EF; lbs PM_{10}/10^6 VMT)										
			Freeway		Major (1)		Collector (1)		Local, Local Urban (1,2)		Local Rural (2) Sand/Gravel Proc. (3)		Avg. Vehicle Weight (tons)
Air Basin	County	Air District	SL	EF	SL	EF	SL	EF	SL	EF	SL	EF	
SF	Alameda	BA	0.015	112.7	0.032	224.6	0.032	224.6	0.32	1,825.5			2.4
SF	Contra Costa	BA	0.015	112.8	0.032	224.8	0.032	224.8	0.32	1,826.8			2.4
SF	Marin	BA	0.015	112.3	0.032	223.8	0.032	223.8	0.32	1,819.0			2.4
SF	Napa	BA	0.015	112.1	0.032	223.5	0.032	223.5	0.32	1,816.4			2.4
SF	San Francisco	BA	0.015	112.2	0.080	223.6	0.080	223.6	0.84	1,817.7			2.4
SF	San Mateo	BA	0.015	112.8	0.032	224.8	0.032	224.8	0.32	1,826.8			2.4
SF	Santa Clara	BA	0.015	112.5	0.032	224.1	0.032	224.1	0.32	1,821.6			2.4
SF	Solano	BA	0.015	113.3	0.032	225.7	0.032	225.7	0.32	1,834.7			2.4
SF	Sonoma	BA	0.015	112.1	0.032	223.3	0.032	223.3	0.32	1,815.1			2.4
SS	Riverside	SC	0.015	116.3	0.032	533.3	0.032	533.3	0.32	4,531.5	1.6	7,992.8	2.4
SV	Butte	BUT	0.015	112.5	0.032	224.3	0.032	224.3	0.32	1,822.9	1.6	7,953.3	2.4
SV	Colusa	COL	0.015	113.1	0.032	225.4	0.032	225.4	0.32	1,832.1	1.6	7,930.7	2.4
SV	Glenn	GLE	0.015	112.5	0.032	224.3	0.032	224.3	0.32	1,822.9	1.6	7,947.6	2.4
SV	Placer	PLA	0.015	112.3	0.032	223.8	0.032	223.8	0.32	1,819.0	1.6	8,015.4	2.4
SV	Sacramento (4)	SAC	0.015	113.0	0.032	225.2	0.032	225.2	0.32	1,830.8			2.4
SV	Shasta	SHA	0.015	111.0	0.032	221.2	0.032	221.2	0.32	1,798.1			2.4
SV	Solano	YS	0.015	112.9	0.032	225.1	0.032	225.1	0.32	1,829.4			2.4
SV	Sutter	FR	0.015	111.6	0.013	222.3	0.013	222.3	0.14	1,807.3			2.4
SV	Tehama	TEH	0.015	111.9	0.013	223.0	0.013	223.0	0.14	1,812.5			2.4
SV	Yolo	YS	0.015	112.9	0.080	225.1	0.080	225.1	0.84	1,829.4			2.4
SV	Yuba	FR	0.015	112.5	0.080	224.3	0.080	224.3	0.84	1,822.9			2.4

1 For Major, Collector and Local roads, the portion of Los Angeles County in the SC Air District (South Coast Air Quality Management District, SCAQMD) and all portions of Orange, Riverside and San Bernardino counties use silt loading values derived from a subset of measurements collected in the SCAQMD and Riverside County. Silt loading measurements used for this update are presented in Appendix A, Table 1. See Table 3 for more information on how silt loading values were derived.
2 The SJU District (San Joaquin Valley Air Pollution Control District) splits local roads into urban and rural classes and uses separate silt loading values. A higher silt loading value derived from AP-42 data is used to compute emissions for local rural roads due to anticipated higher loading levels.
3 SCAQMD provides ARB with only the total PM_{10} emissions for paved roads at sand and gravel processing facilities.
4 Sacramento Area Council of Governments (SACOG) provided 2008 travel fractions for Sacramento County.

Table 8
Annual Rainfall Days: Average Days per Year that California Counties Receive 0.01 Inch or Greater Precipitation Over Years of Record (1)

Air Basin	County	Air District	Annual Rainfall Days (1)
GBV	Alpine	GBU	72
GBV	Inyo	GBU	28
GBV	Mono	GBU	39
LC	Lake	LAK	68
LT	El Dorado	ED	68
LT	Placer	PLA	77
MC	Amador	AMA	64
MC	Calaveras	CAL	72
MC	El Dorado	ED	66
MC	Mariposa	MPA	69
MC	Nevada	NSI	83
MC	Placer	PLA	73
MC	Plumas	NSI	75
MC	Sierra	NSI	79
MC	Tuolumne	TUO	65
MD	Kern	KER	24
MD	Los Angeles	AV	24
MD	Riverside	MOJ	17
MD	Riverside	SC	17
MD	San Bernardino	MOJ	23
NC	Del Norte	NCU	111
NC	Humboldt	NCU	121
NC	Mendocino	MEN	115
NC	Sonoma	NS	75
NC	Trinity	NCU	84
NCC	Monterey	MBU	55
NCC	San Benito	MBU	51
NCC	Santa Cruz	MBU	65
NEP	Lassen	LAS	59
NEP	Modoc	MOD	76
NEP	Siskiyou	SIS	96
SC	Los Angeles	SC	34
SC	Orange	SC	33
SC	Riverside	SC	34
SC	San Bernardino	SC	41
SCC	San Luis Obispo	SLO	42
SCC	Santa Barbara	SB	46
SCC	Ventura	VEN	31
SD	San Diego	SD	42

Air Basin	County	Air District	Annual Rainfall Days (1)
SF	Alameda	BA	61
SF	Contra Costa	BA	60
SF	Marin	BA	66
SF	Napa	BA	68
SF	San Francisco	BA	67
SF	San Mateo	BA	60
SF	Santa Clara	BA	64
SF	Solano	BA	54
SF	Sonoma	BA	69
SJV	Fresno	SJU	45
SJV	Kern	SJU	37
SJV	Kings	SJU	38
SJV	Madera	SJU	44
SJV	Merced	SJU	51
SJV	San Joaquin	SJU	55
SJV	Stanislaus	SJU	52
SJV	Tulare	SJU	40
SS	Imperial	IMP	11
SS	Riverside	SC	17
SV	Butte	BUT	63
SV	Colusa	COL	56
SV	Glenn	GLE	63
SV	Placer	PLA	66
SV	Sacramento	SAC	57
SV	Shasta	SHA	82
SV	Solano	YS	58
SV	Sutter	FR	75
SV	Tehama	TEH	71
SV	Yolo	YS	58
SV	Yuba	FR	63

1 Average days per year that counties within air basin receive $\geq$ 0.01 inch precipitation over years of record, Western Regional Climate Center data, http://www.wrcc.dri.edu/

Table 9
Temporal Profile for Paved Road Dust Emissions,
Based on Monthly Days of Rain (1,2)

Air Basin	County	Air District	Monthly Rainfall Fraction (1,2)											
			Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
GBV	Alpine	GBU	0.078	0.079	0.081	0.083	0.083	0.086	0.087	0.087	0.086	0.086	0.083	0.081
GBV	Inyo	GBU	0.078	0.078	0.081	0.085	0.085	0.088	0.085	0.085	0.085	0.085	0.085	0.081
GBV	Mono	GBU	0.079	0.079	0.082	0.084	0.084	0.084	0.084	0.084	0.086	0.086	0.084	0.082
LC	Lake	LAK	0.074	0.080	0.078	0.082	0.086	0.088	0.091	0.091	0.090	0.086	0.080	0.076
LT	El Dorado	ED	0.080	0.082	0.080	0.078	0.083	0.088	0.088	0.090	0.090	0.086	0.080	0.075
LT	Placer	PLA	0.078	0.079	0.079	0.082	0.084	0.086	0.090	0.089	0.087	0.085	0.082	0.079
MC	Amador	AMA	0.075	0.077	0.078	0.081	0.085	0.089	0.091	0.089	0.089	0.087	0.081	0.077
MC	Calaveras	CAL	0.078	0.078	0.077	0.081	0.084	0.088	0.091	0.090	0.088	0.086	0.081	0.078
MC	El Dorado	ED	0.077	0.077	0.077	0.081	0.085	0.088	0.091	0.091	0.089	0.085	0.081	0.077
MC	Mariposa	MPA	0.079	0.079	0.078	0.080	0.084	0.088	0.088	0.089	0.087	0.086	0.082	0.080
MC	Nevada	NSI	0.077	0.078	0.078	0.081	0.086	0.088	0.091	0.090	0.089	0.086	0.080	0.078
MC	Placer	PLA	0.077	0.078	0.077	0.081	0.085	0.088	0.091	0.090	0.088	0.086	0.080	0.078
MC	Plumas	NSI	0.079	0.079	0.079	0.081	0.084	0.087	0.090	0.090	0.088	0.085	0.081	0.078
MC	Sierra	NSI	0.078	0.079	0.079	0.082	0.083	0.087	0.090	0.090	0.087	0.085	0.081	0.078
MC	Tuolumne	TUO	0.075	0.077	0.077	0.082	0.086	0.089	0.091	0.091	0.089	0.086	0.079	0.077
MD	Kern	KER	0.075	0.075	0.075	0.083	0.087	0.091	0.091	0.087	0.087	0.087	0.083	0.079
MD	Los Angeles	AV	0.076	0.080	0.076	0.080	0.087	0.091	0.087	0.087	0.087	0.087	0.080	0.080
MD	Riverside	MOJ	0.074	0.080	0.080	0.085	0.090	0.090	0.085	0.080	0.085	0.085	0.085	0.080
MD	Riverside	SC	0.074	0.080	0.080	0.085	0.090	0.090	0.085	0.080	0.085	0.085	0.085	0.080
MD	San Bernardino	MOJ	0.075	0.079	0.079	0.083	0.087	0.091	0.083	0.083	0.087	0.087	0.083	0.083
NC	Del Norte	NCU	0.079	0.080	0.079	0.083	0.084	0.087	0.089	0.088	0.088	0.084	0.080	0.079
NC	Humboldt	NCU	0.079	0.080	0.079	0.082	0.085	0.086	0.089	0.089	0.088	0.085	0.080	0.079
NC	Mendocino	MEN	0.078	0.080	0.080	0.083	0.085	0.088	0.089	0.088	0.087	0.085	0.080	0.078
NC	Sonoma	NS	0.076	0.078	0.078	0.081	0.086	0.090	0.091	0.090	0.088	0.086	0.079	0.078
NC	Trinity	NCU	0.078	0.079	0.079	0.082	0.085	0.088	0.090	0.089	0.088	0.084	0.080	0.078
NCC	Monterey	MBU	0.076	0.076	0.076	0.081	0.086	0.089	0.091	0.091	0.089	0.086	0.081	0.078
NCC	San Benito	MBU	0.077	0.075	0.077	0.082	0.087	0.089	0.091	0.091	0.089	0.086	0.080	0.077
NCC	Santa Cruz	MBU	0.076	0.077	0.077	0.083	0.087	0.088	0.091	0.090	0.088	0.087	0.081	0.077
NEP	Lassen	LAS	0.079	0.079	0.080	0.083	0.083	0.085	0.089	0.089	0.088	0.085	0.082	0.079
NEP	Modoc	MOD	0.080	0.080	0.080	0.081	0.083	0.085	0.089	0.089	0.087	0.085	0.081	0.080
NEP	Siskiyou	SIS	0.078	0.080	0.080	0.082	0.084	0.087	0.090	0.089	0.088	0.084	0.080	0.078
SC	Los Angeles	SC	0.075	0.075	0.075	0.083	0.088	0.091	0.091	0.091	0.088	0.086	0.080	0.078
SC	Orange	SC	0.071	0.074	0.077	0.082	0.088	0.088	0.091	0.091	0.091	0.085	0.085	0.077
SC	Riverside	SC	0.075	0.075	0.077	0.083	0.085	0.091	0.091	0.091	0.088	0.085	0.083	0.077
SC	San Bernardino	SC	0.077	0.075	0.075	0.082	0.086	0.088	0.091	0.088	0.088	0.084	0.084	0.080
SCC	San Luis Obispo	SLO	0.074	0.074	0.076	0.082	0.087	0.091	0.091	0.091	0.089	0.087	0.080	0.078
SCC	Santa Barbara	SB	0.075	0.075	0.075	0.081	0.087	0.089	0.091	0.091	0.089	0.087	0.081	0.079
SCC	Ventura	VEN	0.073	0.073	0.076	0.082	0.088	0.091	0.091	0.091	0.088	0.088	0.082	0.079
SD	San Diego	SD	0.076	0.076	0.076	0.080	0.087	0.089	0.091	0.091	0.089	0.087	0.082	0.078
SF	Alameda	BA	0.076	0.077	0.077	0.082	0.088	0.089	0.091	0.089	0.089	0.085	0.079	0.077
SF	Contra Costa	BA	0.076	0.077	0.077	0.082	0.086	0.089	0.091	0.091	0.089	0.086	0.080	0.076
SF	Marin	BA	0.074	0.077	0.077	0.083	0.087	0.090	0.091	0.091	0.090	0.085	0.080	0.076
SF	Napa	BA	0.077	0.075	0.077	0.081	0.087	0.089	0.091	0.091	0.089	0.087	0.079	0.076
SF	San Francisco	BA	0.076	0.076	0.077	0.083	0.087	0.090	0.091	0.090	0.088	0.085	0.080	0.077
SF	San Mateo	BA	0.076	0.077	0.077	0.082	0.086	0.089	0.091	0.091	0.089	0.086	0.080	0.076
SF	Santa Clara	BA	0.078	0.074	0.077	0.080	0.087	0.090	0.091	0.091	0.090	0.087	0.080	0.077
SF	Solano	BA	0.072	0.077	0.077	0.082	0.088	0.089	0.091	0.091	0.089	0.088	0.079	0.076
SF	Sonoma	BA	0.075	0.078	0.078	0.083	0.087	0.089	0.091	0.091	0.089	0.085	0.079	0.076

1 Western Regional Climate Center data (http://www.wrcc.dri.edu/), average days per month with rainfall of 0.01 inch or greater, based on California meteorological station level rainfall data for years of record.

2 Normalized Rainfall per Month = 1- [Rain days per month/annual rain days]
Monthly Rainfall Fraction = [Normalized Rainfall per Month]/[Total Normalized Rainfall]

Table 9
Temporal Profile for Paved Road Dust Emissions,
Based on Monthly Days of Rain (1,2)

Air Basin	County	Air District	Monthly Rainfall Fraction (1,2)											
			Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
SJV	Fresno	SJU	0.075	0.075	0.077	0.083	0.087	0.089	0.091	0.091	0.089	0.087	0.081	0.077
SJV	Kern	SJU	0.076	0.076	0.076	0.081	0.086	0.090	0.090	0.090	0.088	0.086	0.083	0.078
SJV	Kings	SJU	0.076	0.076	0.076	0.081	0.086	0.090	0.090	0.090	0.090	0.086	0.081	0.076
SJV	Madera	SJU	0.074	0.076	0.076	0.083	0.087	0.089	0.091	0.091	0.089	0.087	0.081	0.076
SJV	Merced	SJU	0.073	0.077	0.077	0.082	0.087	0.091	0.091	0.091	0.089	0.087	0.080	0.077
SJV	San Joaquin	SJU	0.076	0.076	0.077	0.082	0.087	0.089	0.091	0.091	0.089	0.086	0.079	0.077
SJV	Stanislaus	SJU	0.074	0.075	0.077	0.082	0.088	0.089	0.091	0.091	0.089	0.086	0.081	0.077
SJV	Tulare	SJU	0.075	0.075	0.077	0.082	0.086	0.091	0.091	0.091	0.088	0.086	0.082	0.077
SS	Imperial	IMP	0.075	0.075	0.075	0.092	0.092	0.092	0.083	0.083	0.083	0.083	0.083	0.083
SS	Riverside	SC	0.074	0.074	0.079	0.085	0.090	0.090	0.090	0.085	0.085	0.085	0.085	0.079
SV	Butte	BUT	0.075	0.076	0.078	0.082	0.085	0.088	0.091	0.091	0.089	0.085	0.081	0.078
SV	Colusa	COL	0.075	0.076	0.078	0.083	0.086	0.089	0.091	0.091	0.089	0.086	0.080	0.076
SV	Glenn	GLE	0.075	0.078	0.079	0.082	0.085	0.088	0.091	0.090	0.090	0.085	0.079	0.077
SV	Placer	PLA	0.076	0.077	0.077	0.081	0.086	0.088	0.091	0.091	0.088	0.086	0.080	0.077
SV	Sacramento	SAC	0.075	0.077	0.077	0.083	0.086	0.089	0.091	0.091	0.089	0.086	0.080	0.077
SV	Shasta	SHA	0.076	0.079	0.078	0.081	0.083	0.088	0.091	0.090	0.090	0.086	0.081	0.078
SV	Solano	YS	0.074	0.077	0.077	0.083	0.086	0.089	0.091	0.091	0.089	0.086	0.080	0.075
SV	Sutter	FR	0.076	0.079	0.077	0.081	0.085	0.088	0.091	0.090	0.088	0.086	0.080	0.079
SV	Tehama	TEH	0.077	0.078	0.078	0.082	0.086	0.088	0.091	0.090	0.088	0.086	0.079	0.077
SV	Yolo	YS	0.075	0.077	0.078	0.083	0.086	0.089	0.091	0.091	0.089	0.086	0.080	0.075
SV	Yuba	FR	0.075	0.078	0.078	0.082	0.087	0.089	0.091	0.089	0.089	0.085	0.079	0.076

1 Western Regional Climate Center data (http://www.wrcc.dri.edu/), average days per month with rainfall of 0.01 inch or greater, based on California meteorological station level rainfall data for years of record.

2 Normalized Rainfall per Month = 1- [Rain days per month/annual rain days]
Monthly Rainfall Fraction = [Normalized Rainfall per Month]/[Total Normalized Rainfall]

Appendix A.
Table 1. 1995-1997 Silt Loading Values

Location	Date	Silt Loading (g/m^2)	Sampling Location	Researcher(1)
HIGH Average Daily Traffic (ADT) Roads (> 5,000 vehicle passes/day)				
South Coast	Apr-95	0.012	Composite of 4 roads of same class	MRI
South Coast	Jun-95	0.015	Repeat sample of above roads	MRI
South Coast	Jun-95	0.011	Composite of 4 roads of same class	MRI
South Coast	Jun-95	0.046	Composite of 4 roads of same class	MRI
Bakersfield	Apr-95	0.054	Composite of 4 roads of same class	MRI
Bakersfield	Jul-95	0.015	Repeat sample of above roads	MRI
Bakersfield	Jul-95	0.051	Composite of 4 roads of same class	MRI
Bakersfield	Jul-95	0.039	Composite of 4 roads of same class	MRI
Coachella Valley	Apr-95	0.027	Composite of 4 roads of same class	MRI
Coachella Valley	Jul-95	0.037	Repeat sample of above roads	MRI
Coachella Valley	Jul-95	0.082	Composite of 4 roads of same class	MRI
Coachella Valley	Jul-95	0.03	Composite of 4 roads of same class	MRI
Sacramento	1997	0.0332	Sunrise Crosswalk North	UCD
Sacramento	1997	0.0261	Sunrise Crosswalk south	UCD
Sacramento	1997	0.0184	Greenback Crosswalk West	UCD
Sacramento	1997	0.0136	Greenback Crosswalk East	UCD
Sacramento	8/23/1995	0.0543	Florin Rd East	UCD
Sacramento	8/23/1995	0.0034	Florin Road West	UCD
Sacramento	8/23/1995	0.0016	Stockton Blvd South	UCD
Sacramento	8/23/1995	0.002	Stockton Blvd North	UCD
Riverside	3/18/1997	0.065	Canyon Crest Drive	UCR
Riverside	6/5/1997	0.085	Canyon Crest Drive	UCR
Riverside	6/19/1996	0.00593	Main Street	UCR
Riverside	9/3/1996	0.00593	Main Street	UCR
Riverside	3/17/1997	0.2	Riverside Street	UCR
Riverside	5/29/1997	0.17	Riverside Street	UCR
Riverside	3/19/1997	0.19	Riverside Street	UCR
Riverside	6/4/1997	0.085	Riverside Street	UCR
Riverside	5/27/1997	0.38	Fogg Street	UCR
Riverside	3/26/1997	0.13	Fogg Street	UCR
Riverside	6/3/1997	0.14	Fogg Street	UCR
Geometric mean of high ADT roads = 0.032 g/m^2, used as California statewide default silt loading for Major and Collector roads. See Table 3 for information on deriving statewide, district and county specific silt loading values.				

1 Researcher:
MRI = Midwest Research Institute
(http://www.arb.ca.gov/ei/areasrc/arbmiscprocpaverddstbkgrnd.pdf)
UCR = Univ. of California, Riverside
(http://aqp.engr.ucdavis.edu/Documents/DraftRoadDustreport.pdf)
UCD = Univ. of California, Davis
(http://aqp.engr.ucdavis.edu/Documents/pm10_hotspot_Sunrise.pdf)

Appendix A.
Table 1. 1995-1997 Silt Loading Values

Location	Date	Silt Loading (g/m^2)	Sampling Location	Researcher(1)
LOW ADT Roads (< 5,000 vehicle passes/day)				
South Coast	Apr-95	0.18	Composite of 4 roads of same class	MRI
South Coast	Jun-95	0.05	Repeat sample of above roads	MRI
South Coast	Jun-95	0.17	Composite of 4 roads of same class	MRI
South Coast	Jun-95	0.14	Composite of 4 roads of same class	MRI
Bakersfield	Apr-95	0.52	Composite of 4 roads of same class	MRI
Bakersfield	Jul-95	0.19	Repeat sample of above roads	MRI
Bakersfield	Jul-95	0.94	Composite of 4 roads of same class	MRI
Bakersfield	Jul-95	0.41	Composite of 4 roads of same class	MRI
Coachella Valley	Jul-95	0.42	Repeat sample of above roads	MRI
Coachella Valley	Jul-95	0.35	Composite of 4 roads of same class	MRI
Coachella Valley	Jul-95	0.2	Composite of 4 roads of same class	MRI
Mean of low ADT roads = 0.32 g/m^2, used as California statewide default slit loading for Local roads. See Table 3 for information on deriving statewide, district and county specific silt loading values				

1 Researcher:
MRI = Midwest Research Institute
(http://www.arb.ca.gov/ei/areasrc/arbmiscprocpaverddstbkgrnd.pdf)
UCR = Univ. of California, Riverside
(http://aqp.engr.ucdavis.edu/Documents/DraftRoadDustreport.pdf)
UCD = Univ. of California, Davis
(http://aqp.engr.ucdavis.edu/Documents/pm10_hotspot_Sunrise.pdf)