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March 23, 2012

County of El Dorado  
Environmental Management Department  
2850 Fairlane Court  
Placerville, CA 95667

**Attn: Kerri Williams, Time Critical**

Dear Ms. Williams,

Attached is a Motor Vehicle Emission Reduction Project proposal from the County of El Dorado Department of Transportation (DOT) for FY 2012/13 AB2766 DMV Surcharge Fees funding. The proposed project is the **Bayne Road Chip Seal Paving** project. The total project cost is estimated to be: \$291,226.

The grant funding request amount is **\$206,999** for the construction phase to chip seal 2.54 miles of Bayne Road which is currently unpaved. The County DOT Maintenance Division will deliver this project and will provide an in-kind local match estimated at \$84,227 for the pre-construction prep work.

Thank you for your consideration of this fugitive PM10 emission reduction project proposal. If you have any questions, please contact Anne Novotny at 621-5931 or e-mail at [anne.novotny@edcgov.us](mailto:anne.novotny@edcgov.us).

Sincerely,

A handwritten signature in blue ink that reads "Kimberly A. Kerr".

Kimberly A. Kerr, Interim Director  
Department of Transportation

KAK:an

c: Tom Celio, Deputy Director of Maintenance  
Anne Novotny, Senior Planner

## PROJECT SUMMARY

**Applicant:** El Dorado County Department of Transportation

**Contact Person:** Anne Novotny, Senior Planner

**Address:** 2850 Fairlane Court, Placerville, CA 95667

**Telephone:** (530) 621-5931 **FAX:** (530) 626-0387

**Email:** [anne.novotny@edcgov.us](mailto:anne.novotny@edcgov.us)

**Project Description:** Chip seal 2.54 miles of Bayne Road, which is currently unpaved from Milepost 1.0 to Milepost 3.54. The paving project will consist of pre-construction prep work (tree removal, culvert improvements, base grading, construct structural section) and construction (install prime coat, sweeping, install chip seal, final sweeping/clean-up). A Project Location Map is attached (see Attachment B on page 10). Bayne Road is a local road, approximately 5 miles, that connects State Route 193 in Kelsey to State Route 49 in Coloma. There are 52 developed residential lots along Bayne Rd, of which 34 are located along the unpaved segment. Bayne Road is not only used by local residents but also by river rafters and kayakers. It is the shortest route between Chili Bar (where the local rafting companies start trips) and Coloma (where the rafts are pulled out). Coloma is also a popular recreation area and features the Marshall Gold Discovery State Historic Park as well as campsites along the South Fork American River. (See Attachment G for project area photos.)

Estimated Emission Reductions/Cost-Effectiveness	
Useful Life of Project (years)	12
Total Lifetime Emissions Reduced (lbs. of PM-10) 165,580 x 12 = 1,986,960	1,986,960
Cost-Effectiveness (total project costs)* = (CRF * Funding) / (ROG + NOx + PM10) = (0.10 * \$291,226) / (165,580) = \$ .18 dollars per lb.	\$0.18 dollars per lb. (of PM10)
Cost-Effectiveness (AQMD Funded project costs)* = (CRF * Funding) / (ROG + NOx + PM10) = (0.10 * \$206,999) / (165,580) = \$ .12 dollars per lb.	\$0.13 dollars per lb. (of PM10)

\*: See Attachment 3 for instructions

Budget Summary	AB 2766 Funds	Matching Funds	In-Kind Match	Total Project Costs
Materials	\$ 160,719	\$	\$	\$ 160,719
Personnel	\$	\$	\$ 65,241	\$ 65,241
Construction Equipment	\$ 46,280	\$	\$	\$ 46,280
Contract, Aggregate Base Transportation	\$	\$	\$ 16,986	\$ 16,986
Equipment Rental	\$	\$	\$ 2,000	\$ 2,000
<b>TOTAL</b>	<b>\$ 206,999</b>	<b>\$</b>	<b>\$ 84,227</b>	<b>\$ 291,226</b>

\*See Attachment A on page 9 for Budget Itemization.

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Applicant: **County of El Dorado Department of Transportation**

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- Local TPA Review (When Applicable) - N/A
- 2 Copies of Proposal - attached



## PROJECT DESCRIPTION

*Identify objective(s) and describe project scope of work.*

The primary objective of this proposed project is to reduce vehicle fugitive dust (PM10) emissions. The secondary objective is to provide a safer roadway for residents who live off Bayne Road and for other motorists traveling on Bayne Road between the rural communities of Coloma and Kelsey.

The scope of work will involve two phases:

- 1) Pre-construction prep work (tree removal, culvert improvements, base grading and construct structural section), which will be completed by El Dorado County DOT's Road Maintenance crew (Force Account) and will be used as the in-kind match.
- 2) Construction (install prime coat, sweeping, install chip seal, and final sweeping/clean-up), which will also be completed by DOT's Road Maintenance crew and is the portion of this project that we are requesting this grant funding.

The County currently has approximately 70 miles of unpaved County maintained roads. This project is the first priority on DOT's list of unpaved public access roads to chip seal when funding becomes available. This project is currently not programmed due to lack of funding. The County DOT relies on grants such as AB2766 funding to complete unpaved road projects.

## PROJECT ORGANIZATION/BACKGROUND

*Provide description of your organization's ability to implement project. Describe previous, similar, successful projects. If using sub-contractors, identify and state their qualifications. If sub-contractors have not been identified, state qualifications to be met.*

El Dorado County Department of Transportation (DOT) has a Maintenance and Operations Division which currently has 111 full-time allocated positions. Over half of these positions are dedicated to on-going maintenance of public access roads in the West Slope area of the County. The West Slope Road Operations Unit is responsible for on-going road maintenance that includes chip seal applications. DOT's Maintenance Crew is very experienced with performing this work. Within the past three years (2009-2011), DOT Maintenance has completed 96 chip/slurry seal projects covering 59 miles of roadway. The process used produces a roadway surface that typically has a useful life of 12 to 15 years.

The County DOT has received prior AB2766 DMV grants that have been successfully delivered including: the environmental phase of work for the US50/El Dorado Hills Boulevard Interchange Pedestrian Overcrossing, installation of countdown pedestrian signals, procurement of waterless/dustless broom street sweepers, completion of the environmental phase of the SMUD Corridor Class I Bike Path, and is currently in the design phase for the Cameron Park Drive Class I bike lanes project.

Some material will be delivered to the project site by a qualified contractor and all of the construction work will be performed by County personnel in DOT's Maintenance Division.



## EMISSION BENEFITS/COST EFFECTIVENESS

*Estimate total lifetime NOx, ROG and PM-10 emission reductions. Use any historical data on ridership, average daily traffic, vehicle miles traveled, participation or other metric in the calculations. Calculations, assumptions and data necessary for estimates must be included in proposal and will be verified by AQMD staff. Automated Methods to Calculate Cost-Effectiveness and other cost-effectiveness analysis information is at:*

*<http://www.arb.ca.gov/planning/tsaq/eval/eval.htm> Use March 2010 emission factors.*

### **PM10 Fugitive Dust Emission Reduction/Road Dust Control**

**Project definition:** The Bayne Road Paving project is a road paving project that is targeted to reduce vehicle fugitive dust (PM10) emissions.

**How emissions are reduced:** Emission reductions will result from the decrease in PM10 emissions associated with auto trips currently on the unpaved road for commute or other purposes.

### **Inputs to Calculate Cost Effectiveness:**

<b>Inputs</b>	<b>Default</b>	<b>Units</b>	<b>Comments</b>
Funding Dollars ( <b>Funding</b> )	\$206,999	Dollars	Requested Amount
Effectiveness Period ( <b>Life</b> )	12	Years	Life – PM10 Fugitive Dust projects
No. of Operating Days ( <b>D</b> )	365	Days of use/year	Bayne Road is opened year-round, 24/7
Length of Unpaved Road Segment ( <b>L</b> )	2.54	Miles (one direction)	Unpaved segment is from Milepost 1.0 to Milepost 3.54
Average Daily Traffic ( <b>ADT1</b> )*	151	Trips per day	At Milepost 4.68 - west end of Bayne Rd (just east of Mt. Murphy Road)
Average Daily Traffic ( <b>ADT2</b> )*	208	Trips per day	At Milepost 0.02 (east end of Bayne Rd, just west of State Route 193)
Annual Vehicle Miles Traveled ( <b>VMT</b> )	166,414	Miles per year	Average ADT multiplied by No. of Operating Days multiplied by the length of unpaved road segment (151 +208/2) x 365 x 2.54
PM10 Emissions Reduced	82.79	Tons per year	SMAQMD Methodology ( <i>see Attachment D on page 13</i> )
PM10 Emissions Reduced	165,580	Pounds per year	82.79 x 2000 (lbs/ton)
Total Lifetime Emissions Reduced	1,986,960	Pounds for 12 yrs	165,580 x 12
Capital Recovery Factor (CRF) for discount rate of 3%	0.10		Project Life = 12 years; Table on page 2 of <i>ARB Methods to Find the Cost-Effectiveness of Funding Air Quality Projects, May 2005</i>

**Annualized Cost-Effectiveness of Funding Dollars** = (CRF \* Funding) / (ROG + NOx + PM10)  
 = (0.10 \* \$206,999) / (165,580)  
 = **\$ .13 dollars per lb.** (20,670 / 165,580)

\*The average ADT was collected during the one-week period of Friday, February 24 through Thursday, March 1. (See Attachment C on pages 11-12 for hourly and daily traffic counts).

The Methods to Find the Cost-Effectiveness of Funding Air Quality Projects, which is posted on the California Air Resources Board website, does not include a method or example calculations for fugitive PM10 emission reduction projects. For this project proposal, the Sacramento Metropolitan Air Quality Management District (SMAQMD) was consulted. SMAQMD staff provided the methodology to calculate the PM10 emissions reductions (see Attachments D, E and F on pages 13-30).

# WORK STATEMENT

*Describe work phases, tasks and deliverables in sequence. Include all relevant information regarding materials, equipment and personnel involved with the project.*

The following two phases of work will be performed: 1) Pre-Construction Prep Work, and 2) Construction. The Pre-Construction Prep Work includes tree removal, culvert improvements, base grading and construct structural section. The Construction phase involves install prime coat, sweeping, install chip seal, and final sweeping/clean-up.

*List tasks within each phase of work and describe as necessary.*

## **Pre-Construction Prep Work Phase Tasks:**

- 1) **Tree Removal** – Some trees will need to be removed that are encroaching on the current roadway to maintain the 20 feet roadway width to meet fire safe standards.
- 2) **Culvert Improvements** – A field review of drainage structures will be needed to determine if any upgrades needed to ensure proper drainage. Culverts will be replaced on an as needed basis.
- 3) **Base Grading** – Entire improvement section will be rough graded to provide final alignment of roadway section and remove any obstacles.
- 4) **Construct Structural Section** – Aggregate base will be added, graded and compacted to create the final structural section for construction of chip sealed roadway.

## **Construction Phase Tasks:**

- 1) **Install Prime Coat** – DOT Maintenance personnel will apply a prime coat seal of the constructed aggregate roadway to seal the subgrade for preparation of the chip seal surface.
- 2) **Sweeping** – The newly installed prime coat will need to be swept of sand and any loose aggregate prior to the chip seal.
- 3) **Install Chip Seal** – A chip seal surface will be installed in two layers with the first layer spread, compacted and swept with the final layer installed afterward.
- 4) **Final Sweeping/Cleanup** – The day following the chip seal application is installed, a final sweeping will be performed to remove any loose gravel.

*State the sequence of work activities, including a starting date, this date should not be sooner than the contract execution date between the District and Grantee, and a completion date within one year of executed contract.*

	<b>Start Date</b>	<b>Completion Date</b>
1. Pre-Construction Prep Work.....	August 1, 2012	August 15, 2012
2. Construction.....	August 25, 2012	August 31, 2012
3. Project Complete or Open for Use.....	September 1, 2012	September 30, 2012



## ACKNOWLEDGEMENT

*All recipients must provide public acknowledgment that project was funded by AQMD with AB2766 Funds. Acknowledgements include placards on equipment, acknowledgment in a public education address or pamphlets, etc. Describe acknowledgement.*

Acknowledgement that this project was partially funded by the El Dorado County AQMD utilizing AB2766 DMV Surcharge Funds will be included on signage placed at each end of the construction site.

## FUNDING REQUEST/BREAKDOWN OF COST

*Include amount of money requested from AB2766 DMV Surcharge fund and total project cost. Estimate cost for each task. Identify source of funding for each task. Itemize any equipment to be purchased and the proportion of the cost of each piece of equipment to be paid with AB2766 DMV Surcharge funds. Grant funds may only be used to fund the portion of equipment's cost related to the provision of air quality benefit.*

This proposal is requesting \$ **206,999** to fund the construction phase of the **Bayne Road Chip Seal Paving** project. The following table details the total estimated project costs, broken down by task and fiscal year. The second table identifies the revenue sources by fiscal year.

### Cost Estimates by Task

<b>Task</b>	<b>FY 12/13</b>	<b>FY 13/14</b>	<b>Total</b>
Pre-Construction	\$ 125,920	\$ 0	\$ 125,920
Construction	\$ 165,306	\$ 0	\$ 165,306
<b>Total Estimated Project Costs</b>	<b>\$ 291,226</b>	<b>\$ 0</b>	<b>\$ 291,226</b>

### Revenue Source

	<b>FY 12/13</b>	<b>FY 13/14</b>	<b>Total</b>
AB2766 DMV Surcharge funds requested	\$ 206,999	\$ 0	\$ 206,999
Road Fund (In-Kind Match)	\$ 84,227	\$ 0	\$ 84,227
<b>Total Revenue</b>	<b>\$ 291,226</b>	<b>\$ 0</b>	<b>\$ 291,226</b>

## MATCHING FUNDS

*State if matching funds are monetary or in-kind (non-dollar). AQMD staff will evaluate matching funds. Ineligible funds will not be used in cost-effectiveness determination. Provide proof (letter of commitment) that matching funds are available. Matching funds must be available when the grantee enters into contract with AQMD and must be used to fund project. If matching funds become unavailable, projects will be cancelled.*

The El Dorado County DOT Maintenance Crew will perform the pre-construction prep work. The cost of this work will be charged to the County's Force Account and the monetary value of this work will be used as the in-kind matching funds.

## SCHEDULE OF DELIVERABLES

*List of all work products or deliverable items and their anticipated dates of delivery.*

<b>Work Products/Deliverables</b>	<b>Delivery Date</b>
1. Pre-Construction Prep Work .....	August 15, 2012
2. Construction.....	August 31, 2012
3. Project Complete/Open for Use/Grant Closeout.....	September 30, 2012

## MONITORING PROGRAM

*A monitoring program is required for all projects. Describe how project objectives will be measured and reported to the AQMD on a quarterly basis.*

The El Dorado County DOT project manager for this project will provide the District, if requested and at intervals determined by the District, with project progress reports detailing the work performed during the current reporting period; work planned for the next reporting period; problems identified, solved, and/or unresolved; and the percentage of each task completed. A final written report, documenting the work performed, will be provided to the District prior to the end of the Agreement term.





**RESOLUTION NO.** 273-2008

**OF THE BOARD OF SUPERVISORS OF THE COUNTY OF EL DORADO**

**RESOLUTION AUTHORIZING THE DIRECTOR OF TRANSPORTATION TO SUBMIT GRANT APPLICATIONS AND EXECUTE GRANT AGREEMENTS FOR VARIOUS FUNDING PROGRAMS**

WHEREAS, the County of El Dorado Transportation Department intends to pursue various local, State and Federal funding opportunities to augment the Transportation Department's project delivery, maintenance and operations programs; and

WHEREAS, the County of El Dorado Transportation Department intends to periodically submit grant applications for various local, State and Federal transportation funding programs, and other qualified grant funding opportunities that become available; and if awarded, will enter into agreements with various Grantors for implementation of said grants; and

WHEREAS, the County of El Dorado Transportation Department has the non-General Fund discretionary budget available for matching funds that may be required for the various grant programs;

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of the County of El Dorado hereby:

1. Authorizes the County of El Dorado Transportation Department to submit grant applications for various local, State and Federal transportation funding programs, and other grant funding opportunities that become available;
2. Authorizes the Director of Transportation, or the Chief Administrative Officer, to sign in the name of the County of El Dorado all necessary documents required to submit grant applications;
3. Authorizes the Director of Transportation to execute grant agreements subject to County Counsel and Board of Supervisors review and approval;
4. Authorizes this resolution to apply retroactively to the El Dorado County AQMD July 2008 award of AB2766 DMV Surcharge Funds for the vehicle replace purchase of a waterless/dustless broom street sweeper and ratifies the Director of Transportation's signature on those grant documents.

PASSED AND ADOPTED by the Board of Supervisors of the County of El Dorado at a regular meeting of said Board held on the 7 day of October, 2008, by the following vote of said Board:

Ayes: Baumann, Santiago, Dupray, Sweeney, Briggs

**ATTEST:**

Cindy Keck  
Clerk of the Board of Supervisors

Noes: none  
Absent: none

By: [Signature]  
Deputy Clerk

By: [Signature]  
Chairman, Board of Supervisors  
Rusty Dupray

**I CERTIFY THAT:**

THE FOREGOING INSTRUMENT IS A CORRECT COPY OF THE ORIGINAL ON FILE IN THIS OFFICE.

DATE: 10/7/08  
ATTEST: CINDY KECK, Clerk of the Board of Supervisors of the County of El Dorado, State of California.  
By: [Signature]  
Deputy Clerk

**BUDGET ITEMIZATION**

**ATTACHMENT A**

Line Item	Title/Classification	No. of Hours	Base Salary Rate Per Hr	Benefit Per Hr	Overhead Per Hr	Total Rate Per Hr	Total Costs
<b>Personnel</b>							
<b>Pre-Construction Prep Work</b>							
1	Highway Superintendent	20	\$40.08	\$42.28	\$38.67	\$121.03	\$2,420.60
2	Highway Maintenance Supervisor (1)	80	\$30.61	\$26.32	\$26.73	\$83.66	\$6,692.80
3	Sr. Highway Maintenance Worker (1)	80	\$25.52	\$20.81	\$21.75	\$68.08	\$5,446.40
4	Highway Maintenance Worker IV (1)	80	\$24.37	\$24.15	\$22.78	\$71.30	\$5,704.00
5	Highway Maintenance Worker III (2)	160	\$23.18	\$21.01	\$20.75	\$64.94	\$10,390.40
6	Highway Maintenance Worker II (3)	240	\$20.91	\$16.74	\$17.68	\$55.33	\$13,279.20
	<b>Subtotal</b>						<b>\$43,933.40</b>
<b>Construction</b>							
7	Highway Superintendent	20	\$40.08	\$42.28	\$38.67	\$121.03	\$2,420.60
8	Highway Maintenance Supervisor (1)	32	\$30.61	\$26.32	\$26.73	\$83.66	\$2,677.12
9	Sr. Highway Maintenance Worker (1)	32	\$25.52	\$20.81	\$21.75	\$68.08	\$2,178.56
10	Highway Maintenance Worker IV (2)	64	\$24.37	\$24.15	\$22.78	\$71.30	\$4,563.20
11	Highway Maintenance Worker III (2)	64	\$23.18	\$21.01	\$20.75	\$64.94	\$4,156.16
12	Highway Maintenance Worker II (3)	96	\$20.91	\$16.74	\$17.68	\$55.33	\$5,311.68
	<b>Subtotal</b>						<b>\$21,307.32</b>
	<b>Total Personnel</b>						<b>\$65,240.72</b>
13	<b>Contracts</b> (removal, transportation, disposal) Transportation – trucking to haul aggregate base from supplier to project site:	200				\$84.93	<b>\$16,986.00</b>
<b>Materials &amp; Supplies</b>							
14	Pre- Construction Class II 3 /4 A/B	6000				\$10.50	\$63,000.00
15	Construction Chip Seal Aggregate	853				\$19.60	\$16,718.80
16	Chip Seal Emulsion CQS Prime Coat	33.75				\$800.00	\$27,000.00
17	CRH-ZH Chip Seal	67.50				\$800.00	\$54,000.00
	<b>Total Materials &amp; Supplies</b>					<b>Total</b>	<b>\$160,718.80</b>
<b>Equipment Rental</b>							
18	Specialized equipment not owned by DOT Maintenance needed for pre-construction activities Compactor – 2 each @ \$1,000 / week for 2 weeks	2				\$1,000.00	<b>\$2,000.00</b>
<b>Construction Equipment</b>							
19	2 Graders	80				\$46.00	\$3,680.00
20	1 Loader	40				\$36.00	\$1,440.00
21	2 Water Trucks	80				\$40.00	\$3,200.00
22	1 Backhoe	40				\$19.00	\$760.00
23	4 Dump Trucks	960				\$35.00	\$33,600.00
24	1 Chip Spreader	16				\$86.00	\$1,376.00
25	2 Rollers	16				\$54.00	\$864.00
26	2 Brooms	16				\$37.00	\$592.00
27	4 Pickup Trucks	96				\$8.00	\$768.00
	<b>Total Construction Equipment</b>						<b>\$46,280.00</b>

<b>PROJECT GRAND TOTAL:</b>		<b>\$291,226</b>
In-Kind Local Match (Line Items 1-13, 18)	29%	\$84,227
Funding Request Amount	71%	<b>\$206,999</b>



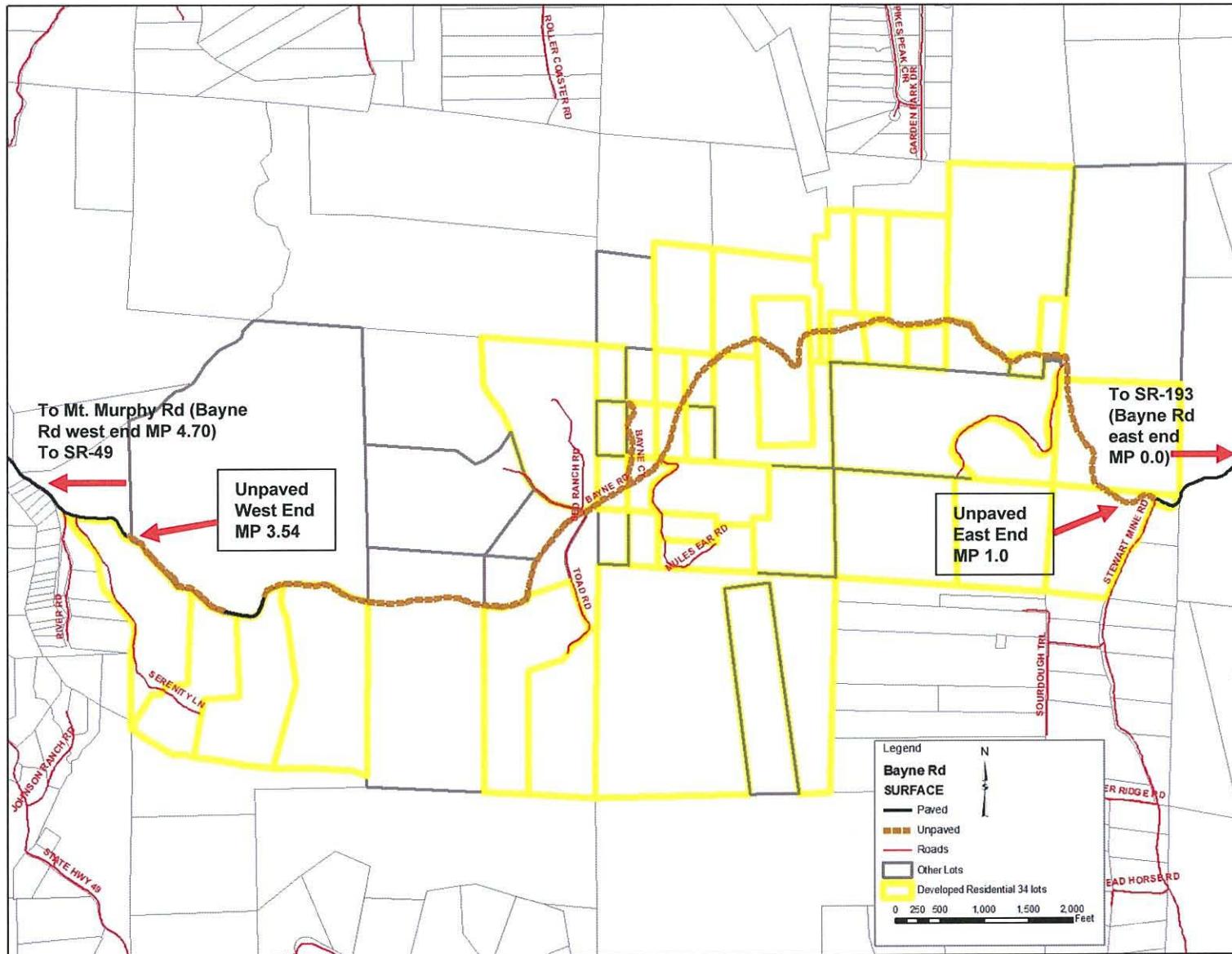
BUDGET ITEMIZATION (Revised 4-23-12)

ATTACHMENT A

Line Item	Title/Classification	No. of Hours	Base Salary Rate Per Hr	Benefit Per Hr	Total Rate Per Hr	Total Costs	As Submitted	Difference	
<b>Personnel Pre-Construction Prep Work</b>									
1	Highway Superintendent	20	\$40.08	\$42.28	\$82.36	\$1,647.20			
2	Highway Maintenance Supervisor (1)	80	\$30.61	\$26.32	\$56.93	\$4,554.40			
3	Sr. Highway Maintenance Worker (1)	80	\$25.52	\$20.81	\$46.33	\$3,706.40			
4	Highway Maintenance Worker IV (1)	80	\$24.37	\$24.15	\$48.52	\$3,881.60			
5	Highway Maintenance Worker III (2)	160	\$23.18	\$21.01	\$44.19	\$7,070.40			
6	Highway Maintenance Worker II (3)	240	\$20.91	\$16.74	\$37.65	\$9,036.00			
	<b>Subtotal</b>					<b>\$29,896.00</b>	\$ 43,933	\$ (14,037)	
<b>Construction</b>									
7	Highway Superintendent	20	\$40.08	\$42.28	\$82.36	\$1,647.20			
8	Highway Maintenance Supervisor (1)	32	\$30.61	\$26.32	\$56.93	\$1,821.76			
9	Sr. Highway Maintenance Worker (1)	32	\$25.52	\$20.81	\$46.33	\$1,482.56			
10	Highway Maintenance Worker IV (2)	64	\$24.37	\$24.15	\$48.52	\$3,105.28			
11	Highway Maintenance Worker III (2)	64	\$23.18	\$21.01	\$44.19	\$2,828.16			
12	Highway Maintenance Worker II (3)	96	\$20.91	\$16.74	\$37.65	\$3,614.40			
	<b>Subtotal</b>					<b>\$14,499.36</b>	\$ 21,307	\$ (6,808)	
<b>Total Personnel</b>							<b>\$44,395.36</b>	\$ 65,241	\$ (20,845)
<b>Contracts (removal, transportation, disposal)</b>									
13	Transportation – trucking to haul aggregate base from supplier to project site:	200			\$84.93	\$16,986.00	\$ 16,986	\$ -	
<b>Materials &amp; Supplies</b>									
14	Pre- Construction Class II 3 /4 A/B	6000			\$10.50	\$63,000.00			
15	Construction Chip Seal Aggregate	853			\$19.60	\$16,718.80			
16	Construction Chip Seal Emulsion CQS Prime Coat	33.75			\$800.00	\$27,000.00			
17	Construction CRH-ZH Chip Seal	67.50			\$800.00	\$54,000.00			
	<b>Total Materials &amp; Supplies</b>				<b>Total</b>	<b>\$160,718.80</b>	\$ 160,719	\$ -	
<b>Equipment Rental</b>									
18	Specialized equipment not owned by DOT Maintenance needed for pre-construction activities Compactor – 2 each @ \$1,000 / week for 2 weeks	2			\$1,000.00	\$2,000.00	\$ 2,000	\$ -	
<b>Construction Equipment</b>									
19	2 Graders	80			\$46.00	\$3,680.00			
20	1 Loader	40			\$36.00	\$1,440.00			
21	2 Water Trucks	80			\$40.00	\$3,200.00			
22	1 Backhoe	40			\$19.00	\$760.00			
23	4 Dump Trucks	960			\$35.00	\$33,600.00			
24	1 Chip Spreader	16			\$86.00	\$1,376.00			
25	2 Rollers	16			\$54.00	\$864.00			
26	2 Brooms	16			\$37.00	\$592.00			
27	4 Pickup Trucks	96			\$8.00	\$768.00			
	<b>Total Construction Equipment</b>					<b>\$46,280.00</b>	\$ 46,280	\$ -	
<b>PROJECT GRAND TOTAL:</b>							<b>\$270,380</b>	\$ 291,226	\$ (20,845)
and Local Match (Line Items 1-13, 18)							23% <b>\$63,381</b>	\$ 84,227	\$ (20,846)
Funding Request Amount							77% <b>\$206,999</b>	\$ 206,999	\$ 0

# BAYNE ROAD CIP SEAL PAVING PROJECT LOCATION MAP

# ATTACHMENT B





**EL DORADO COUNTY  
DEPARTMENT OF TRANSPORTATION**

**Count Summary Beginning: February 24, 2012**

Count Station:	Special	Counter ID:	58
City/Town:		Mile Post:	0.02
Road Name:	Bayne Road	Location:	East end of Bayne Road
Lanes:	2	Direction:	Combined

Date	26	27	28	29	1	24	25	Weekly	Wk Day
Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Average	Avg.
Time									
100	0	0	1	1	0	2	1	1	1
200	1	0	1	1	1	1	1	1	1
300	0	3	4	3	3	2	3	3	3
400	2	0	0	2	0	0	0	1	0
500	0	1	1	1	2	1	1	1	1
600	0	5	5	4	4	3	0	3	4
700	0	9	11	7	13	9	2	7	10
800	4	23	21	9	20	31	5	16	21
900	7	8	9	13	9	14	4	9	11
1000	12	11	8	6	9	9	19	11	9
1100	8	10	11	10	9	19	15	12	12
1200	8	10	10	7	9	11	12	10	9
1300	16	13	9	10	11	20	16	14	13
1400	10	12	10	8	8	12	15	11	10
1500	10	19	21	13	12	22	14	16	17
1600	14	25	25	13	17	27	17	20	21
1700	16	12	24	15	15	17	16	16	17
1800	16	15	18	16	14	16	7	15	16
1900	8	16	9	10	11	19	17	13	13
2000	3	4	4	10	6	14	3	6	8
2100	7	7	1	3	4	10	5	5	5
2200	8	4	2	1	5	9	10	6	4
2300	3	1	0	1	2	5	1	2	2
2400	1	0	2	1	0	1	1	1	1
<b>Totals</b>	<b>154</b>	<b>208</b>	<b>207</b>	<b>165</b>	<b>184</b>	<b>274</b>	<b>185</b>	<b>197</b>	<b>208</b>
AM Peak Hr	10:00	8:00	8:00	9:00	8:00	8:00	10:00	8:00	8:00
AM Count	12	23	21	13	20	31	19	16	21
PM Peak Hr	1:00	4:00	4:00	6:00	4:00	4:00	4:00	4:00	4:00
PM Count	16	25	25	16	17	27	17	20	21

**TOTAL ADT: 208**

**EL DORADO COUNTY  
DEPARTMENT OF TRANSPORTATION**

**Count Summary Beginning: February 24, 2012**

Count Station:	Special	Counter ID:	60
City/Town:		Mile Post:	4.68
Road Name:	Bayne Road	Location:	West End of Bayne Road
Lanes:	2	Direction:	Combined

Date	26	27	28	29	1	24	25	Weekly	Wk Day
Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Average	Avg.
Time									
100	0	0	0	0	0	0	1	0	0
200	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0
500	0	1	0	0	1	1	0	0	1
600	0	0	1	0	1	0	2	1	0
700	0	10	6	6	7	12	1	6	8
800	1	12	8	8	8	8	7	7	9
900	8	9	13	4	8	9	10	9	9
1000	20	8	5	12	8	10	13	11	9
1100	21	10	12	7	8	11	18	12	10
1200	11	9	15	7	13	4	12	10	10
1300	21	10	16	16	8	8	9	13	12
1400	12	6	12	13	6	12	10	10	10
1500	12	9	11	12	9	7	14	11	10
1600	7	12	15	16	16	26	12	15	17
1700	6	8	8	7	15	15	13	10	11
1800	10	18	16	12	9	18	9	13	15
1900	6	11	8	8	6	13	10	9	9
2000	5	7	3	8	5	6	1	5	6
2100	4	3	3	6	4	4	3	4	4
2200	2	2	4	4	1	4	0	2	3
2300	1	0	0	0	0	0	2	0	0
2400	2	1	0	0	1	3	1	1	1
<b>Totals</b>	<b>149</b>	<b>146</b>	<b>156</b>	<b>146</b>	<b>134</b>	<b>171</b>	<b>148</b>	<b>150</b>	<b>151</b>
AM Peak Hr	11:00	8:00	12:00	10:00	12:00	7:00	11:00	11:00	11:00
AM Count	21	12	15	12	13	12	18	12	10
PM Peak Hr	1:00	6:00	1:00	1:00	4:00	4:00	3:00	4:00	4:00
PM Count	21	18	16	16	16	26	14	15	17

**TOTAL ADT: 151**



**Emission Calculations for El Dorado County DOT for Paving Roads to Reduce PM10 Dust**

prepared by SMAQMD LUTRAN staff

3/2/2012

<p><b>ARB Miscellaneous Processes Methodologies</b>  <b>Unpaved Road Dust &amp; Traffic Area Dust - section 7.10 - Unpaved Road Dust (Non-Farm Roads)</b>  <a href="http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-10prev.pdf">http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-10prev.pdf</a></p>
<p><b>Unpaved Road Dust</b></p>
<p><b>Bayne Road</b></p> <p>2.54 Miles of Road (from project)                  2.27 Emission Factor (lbs PM10/mile)                  166,414 estimated annual VMT from EDC DOT                  188.88 tons PM10/year                  dry season is May-Oct, 6 months or 50% of the year where there is no dust control from                  0.50 moisture or rain</p>
<p><b>94.44 tons PM10/year, taking into account the rainy season</b></p>
<p><b>ARB Miscellaneous Processes Methodologies</b>  <b>Unpaved Road Dust &amp; Traffic Area Dust - section 7.9 - Entrained Paved Road Dust, Paved Road Travel</b>  <a href="http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9.pdf">http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9.pdf</a></p>
<p><math>E = k(sL/2)^{0.65}(w/3)^{1.5}</math></p> <p>0.016 k-PM10 fraction multiplier from AP-42                  0.02 sL-roadway silt loading fraction grams/cubic meter from CARB                  2.4 w-average vehicle weight traveling roads from CARB</p> <p>0.1376256 lbs PM10/VMT                  Use the calculated entrained paved road dust emission factor and the same VMT/year from the above projects</p>
<p><b>Entrained Paved Road Dust</b></p>
<p><b>Bayne Road</b></p> <p>166,414 VMT/year (Road miles x passes/day x days/year)                  0.14 Emission Factor (lbs PM10/VMT)</p>
<p><b>11.65 Emissions (tons PM10/year)</b></p>
<p><b>Emissions reduced from paving roads in El Dorado County</b>                  (subtract the emissions from paved roads from unpaved roads)</p>
<p><b>Bayne Road</b></p> <p><b>82.79 Emissions reduced (tons PM10/year)</b></p>

**ALL PROJECT TYPES (GENERIC FORM)**

**Subcategory:** (9a) Road Dust Control (paving roads, shoulders, street sweeping)

**Air District Name:** El Dorado County APCD

**Local Government Name:** Not Applicable

**Project Name:** Bayne Road Chip Seal Paving Project

**Description:** Chip Seal over aggregate base on Bayne Rd for 2.54 miles from Milepost 1.0 to MP 3.54  
**(Issues/Comments)**

**Implementing Agency:** El Dorado County DOT      **Private Agency:** No

**FUNDING:**

**MVFees Funding:** \$206,999  
**MSRC Funding:** \$0  
**Moyer Funding:** \$0  
**CMAQ Funding:** \$0  
**Other CoFunding** \$84,227  
**Project Analysis Period:** 12 years  
**Capital Recovery Factor:** 0.10

**EMISSION REDUCTIONS:**

	Pounds per Year	Tons per Year
<b>ROG:</b>	0	0.00
<b>NOx:</b>	0	0.00
<b>PM10:</b>	165,580	82.79
<b>Total:</b>	<u>165,580</u>	<u>82.79</u>

**COST-EFFECTIVENESS OF:**

<b>Motor Vehicle Fees and/or Moyer Funds:</b>	\$0.13 per pound	\$251 per ton
<b>CMAQ Funds:</b>	\$0 per pound	\$0 per ton
<b>All Funding Sources:</b>	\$0 per pound	\$353 per ton

Source: California Air Resources Board, Automated Methods to Find the Cost Effectiveness of Funding Air Quality Projects, Generic Methods Program

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## SECTION 7.10

### UNPAVED ROAD DUST (NON-FARM ROADS)

(Updated August 1997)

#### EMISSION INVENTORY SOURCE CATEGORY

Miscellaneous Processes / Road Dust

#### EMISSION INVENTORY CODES (CES CODES) AND DESCRIPTION

**645-638-5400-0000 (47399)** Unpaved Road Travel Dust- City & County Roads

**645-640-5400-0000 (47407)** Unpaved Road Travel Dust- U.S. Forests / Park Rd

**645-644-5400-0000 (47423)** Unpaved Road Travel Dust- BLM & BIA Roads

## METHODS AND SOURCES

This source category provides estimates of the entrained geologic particulate matter emissions that result from vehicular travel over non-agricultural unpaved roads. The emissions are estimated separately for three major unpaved road categories: city and county roads, U.S. forests and park roads, and Bureau of Land Management (BLM) and Bureau of Indian Affairs (BIA) roads. The emissions result from the mechanical disturbance of the roadway and the vehicle generated air turbulence effects. Particulate matter estimates for unpaved roads are summarized in Table 1.

## OVERVIEW OF ESTIMATION METHODOLOGY

Dust emissions from unpaved road dust are computed by using an emission factor computed by averaging unpaved road dust emission measurements performed by the University of California, Davis (UCD), and the Desert Research Institute (DRI). Unpaved road vehicle miles traveled (VMT) are based on Caltrans estimates of the unpaved road miles in each county, and the assumption that each mile of unpaved road receives ten vehicle passes each day.

## EMISSIONS ESTIMATION METHODOLOGY

**Emission Factor.** The emission factor used for our estimates of geologic dust emissions from vehicular travel on unpaved roads is based on work performed by UC Davis,<sup>1</sup> and the Desert Research Institute.<sup>2</sup> The emission factor used for all unpaved roads statewide is 2.27 lbs PM<sub>10</sub>/VMT. The derivation of this emission factor is provided in the ARB's unpaved road dust

7.10-1



background document.<sup>3</sup> In summary, the emission factor is the average of 22 unpaved road dust emissions tests performed in the San Joaquin Valley for light-duty truck traffic. Because the emission measurements were performed in California, this emission factor was used to replace the previous generic emission factor provided in U.S. EPA's AP-42 document.<sup>4</sup> The new emission factor is slightly smaller than the factors derived with the AP-42 methodology.

This methodology directly computes  $PM_{10}$  emissions. The TSP emissions are  $PM_{10} \times 1.64$ .<sup>5</sup>

**Activity Data.** For the purpose of estimating emissions, it is assumed that the unpaved road dust emissions are primarily related to the vehicle miles traveled (VMT) on the roads. Using data derived from the Caltrans, "Assembly of Statistical Reports" documents,<sup>6</sup> it was possible to estimate the unpaved road miles for each roadway category in each county to reflect 1993 mileage. The unpaved road dust background document provides the raw data for each road type; it also describes how the data were processed to consolidate it into the three road categories to estimate the unpaved road mileage for each county.

From the previous unpaved road dust methodology, it is then assumed that 10 daily VMT (DVMT) are traveled on unpaved city and county roads. This is based on 1976 and 1979 ARB staff surveys of several county traffic engineers. For U.S. forest and parks roads, it is assumed that 10 DVMT are also traveled per mile of road. This is based on a discussion with a member of the United States Forest Service.<sup>7</sup> Because of the potential similarity in the types of traffic, it is also assumed that the BLM and BIA also receive 10 DVMT.

Table 1 summarizes the VMT activity data for each road grouping and county. Road mileage, if needed, can be simply computed by dividing the annual VMT values by 3650 (which is 10 DVMT x 365 days).

## TEMPORAL ACTIVITY AND GROWTH

Daily activity on unpaved roads occurs primarily during daylight hours. Activity is assumed to be the same each day of the week. Monthly activity varies by county and is based on estimates of monthly rainfall in each county. This is to reflect that during wet months there is less unpaved road traffic, and there are also lower emissions per mile of road when the road soils have a higher moisture content. Table 2 shows the temporal profile for each county in California.

Unpaved road growth is tied to on-road VMT growth for many counties. For other counties, growth is set to zero and VMT is not used.

## ASSUMPTIONS AND LIMITATIONS

1. This methodology assumes that all unpaved roads in California emit the same levels of

PM<sub>10</sub> per VMT during all times of the year for all vehicles and conditions.

2. It is assumed that all unpaved roads in California receive 10 VMT per day.
3. This methodology assumes that no controls are used on the roads included in this inventory.
4. It is assumed that the emission factors derived in the San Joaquin Valley are applicable to the rest of the State.
5. This inventory does not include private unpaved roads. Agricultural unpaved road estimates are computed in a separate methodology.

### **CHANGES IN THE METHODOLOGY**

There were three major methodology changes for this update. First, a new emission factor based on California unpaved road emissions tests was used. This emission factor was slightly less than previous emission factors. Second, the unpaved road mileage was updated to reflect 1993 estimates. The combination of these two changes reduced the estimates of PM<sub>10</sub> from unpaved roads by about 35% statewide. And finally, the monthly temporal profile was updated using regional rainfall to reflect the seasonal variations in unpaved road usage and emissiveness. The temporal profile is used to apportion the emissions to each month. It is not used to adjust the overall annual emissions.

### **COMMENTS AND RECOMMENDATIONS**

Virtually everything in this category could use improvement. Although expensive to develop, more region and season specific emission factors would help to improve the accuracy of the unpaved road dust particulate matter inventory. The VMT activity data are very simplistic, and probably do not well represent actual unpaved road travel conditions. The ARB has initiated a contract with UC Davis to develop better estimates of unpaved road travel in California.

Caltrans also no longer estimates actual unpaved road mileage, so determining the mileage requires scaling mileage from past years. It is likely that, at least for limited regions, better unpaved road mileage estimates can be determined by using updated geographic information systems (GIS) based road coverage maps. Also, inclusion of private roads, if they are determined to be significant, could be used to improve the emission estimates.

## SAMPLE CALCULATIONS

The instructions and associated table below provide an example of unpaved road dust emissions for Humboldt county.

Step 1: Road Miles. From Table 1, input the miles of unpaved road for each category.

Step 2: Passes per Day. Input the estimated vehicle passes per day for each road type. The current California default is 10.

Step 3: Vehicle Miles Traveled (VMT). Compute the annual vehicle miles traveled for each road type. This is:  $Road\ Miles \times Passes/Day \times Days/Year$  (i.e.,  $Step\ 1 \times Step\ 2 \times 365$ ), which, using the ARB default values is  $Road\ Miles \times 3650$ .

Step 4: Emission Factor. Input the roadway emission factor. The default ARB emission factor for unpaved roads is 2.27 lbs  $PM_{10}/VMT$ .

Step 5: Compute Emissions. Multiply the vehicle miles traveled estimate (Step 3) by the emission factor (Step 4), and divide by 2000 lbs/ton to compute the annual road specific  $PM_{10}$  emissions.  $(VMT \times Emission\ Factor)/2000 = Annual\ Emissions$ .

Step 6: Total Emissions. Sum emissions for the unpaved roads to compute the total unpaved road emissions.

### Estimating Unpaved Road Dust $PM_{10}$ Emissions in Humboldt County

		Road Type			Total
		City & County	U.S. Forest & Parks	BLM & BIA	
Step 1	Miles of Road	372	233	292	897
Step 2	Passes/Day	10	10	10	10
Step 3	VMT/year	1,357,800	850,450	1,065,900	3,274,050
Step 4	Emission Factor (lbs $PM_{10}/mile$ )	2.27	2.27	2.27	
Step 5	Emissions (tons $PM_{10}/year$ )	1541	9665	1210	3717

7.10-4



**REFERENCES**

1. Flocchini, Robert; et al. Evaluation of the Emission of PM<sub>10</sub> Particulates from Unpaved Roads in the San Joaquin Valley. Final Report. University of California, Davis. Air Quality Group, Crocker Nuclear Laboratory. San Joaquin Valley Grant File #20960. April 1994.
2. John Gillies; et al. Effectiveness Demonstration of Fugitive Dust Control Methods for Public Unpaved Roads and Unpaved Shoulders on Paved Roads. Final Report. Desert Research Institute. DRI Document No. 68505200.1F1, for the California Regional Particulate Air Quality Study. December 1996.
3. Gaffney, Patrick. Entrained Dust from Unpaved Road Travel. Emission Estimation Methodology. Background Document. California Air Resources Board. September 1997.
4. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, AP-42, Section 11.2.1, Fifth Edition. January 1995.
5. 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.
6. California Department of Transportation. Assembly of Statistical Reports, 1992, and Assembly of Statistical Reports, 1993. California Public Road Data Including Highway Performance Monitoring System (HPMS) Data. February 1994 and January 1995.

**UPDATED BY**

Patrick Gaffney  
August 1997

Table 1. 1993 Unpaved Road Dust Emissions.

AIR BASIN	COUNTY	COUNTY ID #	ARB Inventory Unpaved Road Miles*			PM <sub>10</sub> Emissions (tons/year)			1993 PM <sub>10</sub> Totals (non-Ag. Roads)	
			City/County	BLM/BIA	USFS/Parks	City/County	BLM/BIA	USFS/Parks	Miles	PM <sub>10</sub> (tons/year)
GBV	ALPINE	2	52.8	0.6	62.0	218.6	2.6	256.8	115.4	478.1
	INYO	14	382.4	854.2	363.4	1584.4	3538.7	1505.4	1600.0	6628.4
	MONO	26	225.7	1015.6	455.4	934.9	4207.4	1886.7	1696.7	7029.0
LC	LAKE	17	201.2	125.8	141.3	833.3	521.3	585.5	468.3	1940.0
LT	EL DORADO	9	23.1	1.2	46.9	95.8	5.0	194.3	71.2	295.1
	PLACER	31	22.0	1.8	16.3	91.3	7.3	67.6	40.1	166.2
MC	AMADOR	3	162.0	4.3	92.5	671.3	17.9	383.3	258.9	1072.6
	CALAVERAS	5	250.7	31.4	160.6	1038.5	130.0	665.5	442.7	1834.0
	EL DORADO	9	169.6	8.8	343.9	702.7	36.6	1424.7	522.4	2164.0
	MARIPOSA	22	195.9	63.2	221.5	811.4	261.7	917.6	480.5	1990.6
	NEVADA	29	250.6	27.1	310.1	1038.1	112.1	1284.5	587.7	2434.7
	PLACER	31	134.4	10.7	99.5	556.8	44.5	412.3	244.7	1013.6
	PLUMAS	32	187.0	0.4	777.8	774.5	1.5	3222.1	965.1	3998.2
	SIERRA	46	239.8	4.0	525.1	993.5	16.6	2175.3	768.9	3185.4
	TUOLUMNE	55	127.5	4.9	204.4	528.1	20.4	846.7	336.8	1395.3
NC	DEL NORTE	8	84.7	0.8	216.4	351.0	3.4	896.4	301.9	1250.7
	HUMBOLDT	12	372.0	233.3	292.0	1541.1	966.5	1209.7	897.3	3717.3
	MENDOCINO	23	273.5	120.9	580.5	1132.9	500.9	2404.9	974.9	4035.8
	SONOMA	49	36.1	0.6	7.3	149.4	2.5	30.3	44.0	182.2
NCC	TRINITY	53	189.2	152.0	839.5	784.0	629.6	3477.8	1180.7	4891.3
	MONTEREY	27	258.7	0.0	50.3	1071.8	0.0	208.3	309.0	1280.1
	SAN BENITO	35	95.0	77.4	241.3	393.7	320.5	999.6	413.7	1713.9
NEP	SANTA CRUZ	44	217.5	0.0	144.8	901.1	0.0	599.9	362.3	1500.9
	LASSEN	18	343.0	598.4	427.4	1421.0	2479.2	1770.4	1368.8	5670.3
	MODOC	25	314.4	184.1	609.2	1302.4	762.8	2523.7	1107.7	4588.9
SC	SISKIYOU	47	198.8	41.3	713.7	823.6	170.9	2956.8	953.8	3951.4
	LOS ANGELES	19	540.8	0.0	175.6	2240.5	0.0	727.6	716.4	2968.1
	ORANGE	30	22.6	0.0	1.7	93.5	0.0	7.2	24.3	100.7
SCC	RIVERSIDE	33	181.8	12.7	36.8	753.2	52.6	152.4	231.3	958.2
	SAN BERNARDINO	36	60.9	78.2	18.2	252.5	324.1	75.5	157.4	652.1
	SAN LUIS OBISPO	40	303.4	237.6	106.1	1256.9	984.1	439.3	647.0	2680.4
SD	SANTA BARBARA	42	85.4	0.5	68.3	353.8	2.1	282.9	154.2	638.8
	VENTURA	56	67.7	0.0	52.3	280.4	0.0	216.7	120.0	497.1
	SAN DIEGO	37	554.3	112.4	662.3	2296.2	465.5	2743.6	1328.9	5505.3
SED	IMPERIAL	13	1194.3	113.5	25.9	4947.7	470.3	107.2	1333.7	5325.2
	KERN	15	225.9	202.1	25.8	935.8	837.1	107.0	453.8	1879.9
	LOS ANGELES	19	254.5	0.0	82.6	1054.3	0.0	342.4	337.2	1396.7
	RIVERSIDE	33	517.5	36.1	104.7	2143.7	149.7	433.7	658.3	2727.2
SF	SAN BERNARDINO	36	954.8	1225.8	285.5	3955.6	5078.1	1182.7	2466.1	10216.4
	ALAMEDA	1	43.2	0.0	0.1	178.8	0.0	0.6	43.3	179.4
	CONTRA COSTA	7	53.5	0.0	12.4	221.8	0.0	51.2	65.9	273.0
	MARIN	21	49.4	0.0	39.2	204.8	0.0	162.3	88.6	367.0
	NAPA	28	23.7	0.0	1.2	98.2	0.0	5.0	24.9	103.2
	SAN FRANCISCO	38	0.2	0.0	0.0	0.8	0.0	0.1	0.2	0.8
	SAN MATEO	41	102.7	0.0	20.0	425.3	0.0	83.1	122.7	508.3
	SANTA CLARA	43	329.3	0.0	152.8	1364.3	0.0	632.9	482.1	1997.2
	SOLANO	48	28.5	0.0	0.3	118.1	0.0	1.1	28.8	119.2
	SONOMA	49	23.1	0.4	4.7	95.5	1.6	19.3	28.1	116.5
	SJV	FRESNO	10	1079.3	153.4	509.5	4471.2	635.6	2110.7	1742.2
KERN		15	480.0	429.4	54.9	1988.6	1778.9	227.4	964.3	3994.9
KINGS		16	76.3	0.3	0.0	316.1	1.2	0.0	76.6	317.3
MADERA		20	199.8	0.0	91.5	827.8	0.0	379.0	291.3	1208.8
MERCED		24	572.8	0.0	35.8	2372.9	0.0	148.4	608.6	2521.3
SAN JOAQUIN		39	384.1	0.0	14.2	1591.4	0.0	58.6	398.3	1650.1
STANISLAUS		50	59.6	0.0	0.5	247.0	0.0	2.0	60.1	249.0
TULARE		54	272.2	45.0	74.3	1127.7	186.5	307.7	391.5	1621.9
SV	BUTTE	4	380.0	21.5	167.4	1574.2	88.9	693.3	556.8	2356.4
	COLUSA	6	258.0	24.0	37.5	1069.0	99.6	155.4	319.6	1324.0
	GLENN	11	175.6	0.1	39.4	727.7	0.5	163.3	215.2	891.5
	PLACER	31	63.9	5.1	47.3	264.7	21.2	196.0	116.3	481.9
	SACRAMENTO	34	552.5	0.0	4.2	2289.0	0.0	17.2	556.7	2306.3
	SHASTA	45	382.6	97.8	659.6	1585.0	405.2	2732.5	1140.0	4722.7
	SOLANO	48	114.0	0.0	1.1	472.4	0.0	4.5	115.1	476.9
	SUTTER	51	144.8	0.0	0.0	599.9	0.0	0.0	144.8	599.9
	TEHAMA	52	313.3	10.2	276.6	1298.1	42.2	1145.8	600.1	2486.1
	YOLO	57	137.0	0.1	0.0	567.6	0.4	0.0	137.1	568.0
	YUBA	58	157.2	2.8	53.0	651.2	11.8	219.5	213.0	882.4
	TOTALS		16428	6372	11886	68058	26397	49241	34686	143697

\*Road miles are shown. To compute annual VMT, multiply miles by 10 passes/day times 365 days per year ( VMT = miles x 3650).

PM Fraction: PM<sub>10</sub> = TSP x 0.61 (TSP Emissions = PM<sub>10</sub>/0.61)

**Table 2  
Seasonal Profile for Unpaved Road Dust Emissions**

Basin	Co #	County	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GBV	2	ALPINE	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	14	INYO	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	26	MONO	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
LC	17	LAKE	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
LT	9	EL DORADO	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
MC	31	PLACER	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	3	AMADOR	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	5	CALAVERAS	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	9	EL DORADO	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	22	MARIPOSA	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	29	NEVADA	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	31	PLACER	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	32	PLUMAS	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	46	SIERRA	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	55	TUOLUMNE	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
NC	8	DEL NORTE	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
	12	HUMBOLDT	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
	23	MENDOCINO	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
	49	SONOMA	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
	53	TRINITY	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
NCC	27	MONTEREY	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
	35	SAN BENITO	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	44	SANTA CRUZ	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
NEP	18	LASSEN	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	25	MODOC	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	47	SISKIYOU	0.024	0.022	0.023	0.084	0.093	0.151	0.151	0.151	0.151	0.082	0.040	0.031
SC	19	LOS ANGELES	0.010	0.012	0.015	0.100	0.120	0.081	0.135	0.135	0.135	0.134	0.100	0.024
	30	ORANGE	0.010	0.012	0.015	0.100	0.120	0.081	0.135	0.135	0.135	0.134	0.100	0.024
	33	RIVERSIDE	0.052	0.088	0.084	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.074
	36	SAN BERNARDINO	0.052	0.088	0.084	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.074
SCC	40	SAN LUIS OBISPO	0.020	0.023	0.022	0.071	0.069	0.126	0.159	0.159	0.132	0.104	0.078	0.036
	42	SANTA BARBARA	0.015	0.020	0.020	0.087	0.066	0.127	0.137	0.128	0.145	0.130	0.087	0.037
	56	VENTURA	0.010	0.012	0.015	0.100	0.120	0.081	0.135	0.135	0.135	0.134	0.100	0.024
	37	SAN DIEGO	0.010	0.012	0.015	0.100	0.120	0.081	0.135	0.135	0.135	0.134	0.100	0.024
SED	13	IMPERIAL	0.052	0.088	0.084	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.074
	15	KERN	0.042	0.044	0.029	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.087	0.057
	19	LOS ANGELES	0.010	0.012	0.015	0.100	0.120	0.081	0.135	0.135	0.135	0.134	0.100	0.024
	33	RIVERSIDE	0.052	0.088	0.084	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.074
	36	SAN BERNARDINO	0.052	0.088	0.084	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.074
SF	1	ALAMEDA	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
	7	CONTRA COSTA	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
	21	MARIN	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
	28	NAPA	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	38	SAN FRANCISCO	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
	41	SAN MATEO	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
	43	SANTA CLARA	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	48	SOLANO	0.014	0.017	0.025	0.046	0.059	0.169	0.228	0.224	0.046	0.115	0.044	0.013
	49	SONOMA	0.021	0.029	0.032	0.074	0.087	0.151	0.166	0.178	0.080	0.106	0.050	0.025
	SJV	10	FRESNO	0.030	0.033	0.026	0.099	0.121	0.121	0.121	0.121	0.121	0.104	0.058
15		KERN	0.042	0.044	0.029	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.087	0.057
16		KINGS	0.039	0.035	0.028	0.107	0.107	0.107	0.107	0.107	0.107	0.107	0.093	0.060
20		MADERA	0.030	0.033	0.026	0.099	0.121	0.121	0.121	0.121	0.121	0.104	0.058	0.046
24		MERCED	0.029	0.023	0.026	0.110	0.094	0.110	0.110	0.110	0.110	0.110	0.110	0.055
39		SAN JOAQUIN	0.024	0.026	0.025	0.080	0.096	0.138	0.138	0.138	0.138	0.103	0.051	0.043
50		STANISLAUS	0.028	0.028	0.029	0.092	0.080	0.121	0.121	0.121	0.121	0.115	0.098	0.047
54		TULARE	0.028	0.032	0.021	0.104	0.115	0.121	0.121	0.121	0.121	0.121	0.058	0.039
SV	4	BUTTE	0.024	0.029	0.026	0.069	0.078	0.099	0.209	0.209	0.115	0.075	0.037	0.030
	6	COLUSA	0.020	0.022	0.025	0.077	0.099	0.153	0.153	0.153	0.133	0.105	0.034	0.027
	11	GLENN	0.017	0.025	0.023	0.074	0.060	0.147	0.147	0.147	0.133	0.123	0.075	0.029
	31	PLACER	0.009	0.022	0.023	0.054	0.090	0.170	0.170	0.170	0.170	0.050	0.032	0.041
	34	SACRAMENTO	0.023	0.021	0.022	0.086	0.105	0.153	0.153	0.153	0.153	0.074	0.035	0.024
	45	SHASTA	0.024	0.022	0.023	0.084	0.093	0.151	0.151	0.151	0.151	0.082	0.040	0.031
	48	SOLANO	0.023	0.026	0.023	0.068	0.076	0.185	0.185	0.185	0.096	0.079	0.030	0.024
	51	SUTTER	0.023	0.021	0.022	0.086	0.105	0.153	0.153	0.153	0.153	0.074	0.035	0.024
	52	TEHAMA	0.023	0.026	0.023	0.068	0.076	0.185	0.185	0.185	0.096	0.079	0.030	0.024
	57	YOLO	0.016	0.020	0.021	0.076	0.086	0.155	0.155	0.155	0.149	0.108	0.039	0.021
	58	YUBA	0.021	0.020	0.021	0.055	0.067	0.144	0.178	0.178	0.178	0.069	0.045	0.023



## SECTION 7.9

### ENTRAINED PAVED ROAD DUST PAVED ROAD TRAVEL

(Updated July 1997)

#### EMISSION INVENTORY SOURCE CATEGORY

Miscellaneous Processes / Road Dust

#### EMISSION INVENTORY CODES (CES CODES) AND DESCRIPTION

<b>640-635-5400-0000 (83618)</b>	Paved Entrained Road Dust	- Freeways
<b>640-637-5400-0000 (83626)</b>	Paved Entrained Road Dust	- Major Streets
<b>640-639-5400-0000 (83634)</b>	Paved Entrained Road Dust	- Collector Streets
<b>640-641-5400-0000 (83642)</b>	Paved Entrained Road Dust	- Local Streets
<b>640-636-5400-0000 (47456)</b> (obsolete)	Paved Entrained Road Dust	- Paved Roads

## METHODS AND SOURCES

The paved road dust category includes emissions of fugitive dust particulate matter entrained by vehicular travel on paved roads. Road dust emissions are estimated for four classes of roads. The four classifications are: 1) freeways/expressways, 2) major streets/highways, 3) collector streets, and 4) local streets. The estimated particulate matter emissions for paved road dust for each California county are listed in Table 1. Table 2 shows the portion of travel on each of the four major road types in each county.

## OVERVIEW OF ESTIMATION METHODOLOGY

Dust emissions from vehicle travel on paved roads are computed using the emission factor equation provided in the Fifth Edition of U.S. EPA's AP-42 document.<sup>1</sup> Inputs to the paved road dust equation were developed from California specific roadway silt loading and average vehicle weight data measured by Midwest Research Institute (MRI) in 1995.<sup>2</sup> Data from the Air Resources Board and air districts were used to estimate county specific VMT (vehicle miles traveled) data.<sup>3,4</sup> Caltrans HPMS (Highway Performance Monitoring System)<sup>5</sup> data were used to estimate the fraction of travel on each of the four road types in each county. The paved road dust category does not include directly emitted brake and tire wear, nor TOG, CO, NO<sub>x</sub>, SO<sub>x</sub>, or PM exhaust emissions. These directly emitted motor vehicle emissions are included in the motor vehicle emission inventory.

## EMISSIONS ESTIMATION METHODOLOGY

The emission factor provided by the EPA for estimating entrained dust emissions from vehicles traveling on paved roads is:

$$E = k \left( \frac{sL}{2} \right)^{0.65} \left( \frac{W}{3} \right)^{1.5}$$

where E is the particulate emission factor in units of pounds of particulate matter per VMT, k is the particle size multiplier (used to compute PM<sub>10</sub>, PM<sub>2.5</sub>, etc.), sL is the roadway silt loading in grams/square meter, and W is the average weight (in tons) of vehicles traveling the road.

The statewide average vehicle weight is assumed to be 2.4 tons. This estimate is based on an informal traffic count estimated by MRI while they were performing California silt loading measurements. Table 3 shows the roadway silt loadings and emission factors used in each California county. The silt loading values are the averages of silt loadings measured by MRI in the South Coast AQMD and the San Joaquin Valley Unified AQMD.<sup>2</sup> (Note: The South Coast Air Quality Management District (SCAQMD) computed county specific average vehicle weight estimates by using average fleet weights with estimates of the amount of VMT traveled by each vehicle class. The weights used are shown in Table 3.)

The county roadway emission factors, combined with ARB and air district VMT data<sup>3,4</sup> for each roadway type, are linked with the Caltrans HPMS data<sup>5</sup> to estimate emissions for each road type in each county. Further detail on the derivation of the paved road dust emission factors, silt loadings, and roadway travel fractions are available in the ARB background document for entrained paved road dust.<sup>6</sup>

## TEMPORAL ACTIVITY AND GROWTH

Temporal activity is assumed to be the same as on-road vehicle travel: uniform in spring and fall, increasing slightly in summer, and decreasing slightly in winter. The monthly temporal profile below shows this trend. The weekly and daily activities are estimated to have higher activities on weekdays and during daylight hours.

CES	Hours	Days	Weeks
ALL	24	7	52

CES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ALL	7.7	7.7	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7.7

## ASSUMPTIONS AND LIMITATIONS

1. The current AP-42 emission factor assumes that road dust emissions are proportional to VMT, roadway silt loading, and average vehicle weight.
2. Virtually the same silt loading values are used throughout the state. These silt loadings are based on a total of eight silt loading measurements each in the South Coast Area, Coachella Valley, and Bakersfield. This does not fully represent the variability in California silt loading.
3. The methodology assumes that roadway silt loading, and therefore the emission factor, varies by the type of road.
4. It is assumed that the EPA particle size multiplier (i.e., the 'k' factor in the AP-42 equation) reasonably represents the size distribution of California paved road dust.
5. The average vehicle fleet weight is assumed to be 2.4 tons, statewide (except for the SCAQMD).
6. For freeway and major roads, emissions growth is assumed to be proportional to changes in roadway centerline mileage. For collector and local roads, emissions growth is assumed proportional to changes in VMT.

## CHANGES IN THE METHODOLOGY

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

- Incorporation of the new EPA paved road emission factor from the Fifth Edition of EPA's AP-42 document (January 1995, Section 13.2.1).
- Update of the Vehicle Miles Traveled (VMT) data to 1993 levels based on ARB and Air District supplied values.
- Update of the fractions of vehicle miles traveled on each of the four major roadway categories (i.e., freeways, major roads, collectors, and local roads) to reflect 1993 data.
- Incorporation of California specific roadway silt loading values.
- Emissions growth was changed so that freeways and major roads are grown based on increases in roadway centerline mileage, and local and collector roads are grown based on increases in VMT. Previously, all roads were grown based on VMT.

The changes reduced the paved road dust emission estimates by about 70% from the previous 1993 published emission inventory estimates.

## COMMENTS AND RECOMMENDATIONS

Studies are ongoing by the University of California, Riverside, and the University of California, Davis, to better understand and quantify paved road dust emissions. These studies are not showing clear correlations between roadway silt loading and dust production, or VMT and dust production in urban areas. The results of these studies will be incorporated into this methodology when they are available. Also, effort is needed to better account for the variability in dust emissions based on population density, adjacent land uses, and geographic location.

## SAMPLE CALCULATIONS

The table below summarizes the data computations necessary to estimate the paved road dust emissions in Santa Cruz county. The following steps are performed:

- Step 1: Silt Loadings. Use the ARB default silt loadings, or local silt loadings if better data are available. Detailed information on the derivation of the ARB default values is included in reference 6.
- Step 2: Emission Factor. Using the silt loadings shown and the AP-42 emission factor equation shown previously, compute the emission factor for each road type. In this case, a default average vehicle weight of 2.4 tons is used. Also, because  $PM_{10}$  emissions are being computed, a 'k' factor of 0.016 is used from AP-42. For reference, the 'k' factor for  $PM_{2.5}$  is 0.0073 (for units of lb/VMT).
- Step 3: Using the data in Table 2, fill in the county specific travel fraction data. These data are derived from Caltrans HPMS data.<sup>5</sup> See reference 6 for additional information on how the traffic splits were derived.
- Step 4: Using the county total VMT values provided in Table 1, and the travel fraction values from Step 3, compute the VMT traveled on each roadway type.  
*Total VMT x Travel Fraction = Road VMT.*
- Step 5: Multiply the emission factors in Step 2 by the VMT data in Step 4 to compute the  $PM_{10}$  emissions for each road type. *Road EF x Road VMT = Road Emissions.* Divide the computed values by 2000 lbs/ton to get the annual tons of  $PM_{10}$ /year from paved road dust.
- Step 6: The ARB's database system maintains particulate emissions as Total Suspended Particulates (TSP). Therefore, the  $PM_{10}$  emissions must be converted to TSP emissions. For California paved road dust, it is estimated that 46% of TSP is  $PM_{10}$ , therefore, dividing the  $PM_{10}$  value by 0.46 produces the correct TSP emissions.<sup>7</sup>



**Estimating Paved Road Dust Emissions  
In Santa Cruz County**

		Road Type				
		Freeway	Major	Collector	Local	
<i>Step 1</i>	Silt Loading (g/m <sup>2</sup> )	0.02	0.035	0.32	0.32	
<i>Step 2</i>	Emission Factor (lbs PM <sub>10</sub> /1e6 VMT)	574	825	825	3479	Totals
<i>Step 3</i>	Travel Fraction	0.285	0.465	0.181	0.069	1
<i>Step 4</i>	VMT (1993, million/yr)	519	847	330	125	1821
<i>Step 5</i>	PM <sub>10</sub> Emissions (tons /yr)	149	349	136	219	853
<i>Step 6</i>	TSP Emissions (tons/yr)	324	759	296	476	1855

**ADDITIONAL CODES**

SOURCE CATEGORY GROWTH AND CONTROL CODES

Various

SOURCE CATEGORY CODE POLLUTANT SPECIATION PROFILES

For All: PM = 393, VOC = not applicable

SOURCE CATEGORY CODE REACTIVITY FACTORS

Not Applicable

**REFERENCES**

1. U.S. Environmental Protection Agency. Compilation of Air Pollutant Emission Factors, AP-42, Section 13.2.1, Fifth Edition. January 1995.
2. Muleski, Greg. Improvement of Specific Emission Factors (BACM Project No. 1). Final Report. Midwest Research Institute, March 29, 1996.
3. California Air Resources Board, Technical Support Division. 1993 Vehicle Miles Traveled by County from 1993 Ozone SIP EMFAC/BURDEN7F runs. Contact: Ed Yotter.
4. County VMT data for 1993 for the San Joaquin Valley Unified Air Pollution Control District and South Coast Air Quality Management District were obtained from district staff (who collected the information from local transportation agencies).
5. California Department of Transportation. California 1993 Daily Vehicle Miles of Travel for Public Maintained Paved Roads based on Highway Performance Monitoring System (HPMS) Data from 'TRAV93'. Barry Chrissinger; May 1995.
6. Gaffney, Patrick. Entrained Dust from Paved Road Travel, Emission Estimation Methodology, Background Document. California Air Resources Board. July 1997.
7. 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.

**UPDATED BY**

Patrick Gaffney  
August 1997

**TABLE 1**  
**1993 Reentrained Paved Road Dust Emissions for PM<sub>10</sub> and TSP**  
 EIC: Various; Activity: On Road Travel; Process: Paved Road

AIR BASIN	COUNTY	1993 VMT (million VMT per year)	Paved Road Dust PM10 Emissions (tons/yr)				1993 PM <sub>10</sub> Emissions (tons/year)	1993 TSP Emissions (tons/year)
			Freeway	Major	Collector	Local		
			GBV	ALPINE	52	0.0		
	INYO	460	0.0	140.8	25.1	100.8	267	580
	MONO	311	0.0	99.7	10.2	78.4	188	409
LC	LAKE	420	0.0	110.9	28.5	144.0	283	616
LT	EL DORADO	343	0.0	111.8	7.1	95.3	214	466
	PLACER	158	19.4	21.9	6.3	38.6	86	187
MC	AMADOR	304	0.0	90.1	20.7	62.0	173	376
	CALAVERAS	320	0.0	90.2	26.5	64.3	181	393
	EL DORADO	1479	0.0	482.4	30.4	411.2	924	2009
	MARIPOSA	226	0.0	67.0	10.9	65.2	143	311
	NEVADA	948	88.4	143.9	53.8	279.4	565	1229
	PLACER	262	32.1	36.3	10.5	64.0	143	311
	PLUMAS	278	0.0	66.5	24.2	101.2	192	417
	SIERRA	92	3.4	17.8	4.9	43.3	69	151
	TUOLUMNE	511	0.0	130.5	47.4	138.5	316	688
NC	DEL NORTE	223	0.0	62.3	19.3	44.5	126	274
	HUMBOLDT	1114	0.0	329.6	55.1	315.8	701	1523
	MENDOCINO	997	0.0	258.2	87.3	278.3	624	1356
	TRINITY	142	0.0	40.2	4.9	57.5	103	223
	SONOMA	514	29.9	109.2	37.3	95.9	272	592
NCC	MONTEREY	3223	119.9	784.5	219.5	647.1	1771	3850
	SAN BENITO	375	0.0	123.5	10.1	89.7	223	485
	SANTA CRUZ	1821	149.1	349.3	136.1	218.6	853	1855
NEP	LASSEN	492	0.0	118.0	44.4	171.9	334	727
	MODOC	149	0.0	28.4	11.7	89.6	130	282
	SISKIYOU	812	101.1	73.2	30.0	365.3	570	1238
SC	LOS ANGELES	65793	9858.7	15402.2	1802.2	5814.7	32878	71474
	ORANGE	22026	3386.3	5105.9	420.7	2153.7	11067	24058
	RIVERSIDE	11278	2291.0	2564.7	828.0	2450.7	8134	17683
	SAN BERNARDINO	10853	2356.7	3042.6	645.5	2324.3	8369	18194
SCC	SAN LUIS OBISPO	2351	28.9	740.9	64.0	521.8	1356	2947
	SANTA BARBARA	3105	269.8	653.6	158.5	343.5	1425	3098
	VENTURA	5858	576.8	1215.3	160.4	895.0	2848	6191
SD	SAN DIEGO	23094	3478.3	3105.1	757.4	2804.8	10146	22056
SED	IMPERIAL	1341	94.0	223.3	417.3	404.3	1139	2476
	KERN	817	54.9	197.8	33.8	111.1	398	864
	LOS ANGELES	1409	203.4	306.5	35.9	144.6	690	1501
	RIVERSIDE	4780	877.0	947.0	305.7	1131.1	3261	7089
	SAN BERNARDINO	5173	661.0	823.1	174.6	786.0	2445	5315
SF	ALAMEDA	9867	1656.1	1306.5	293.6	986.5	4143	9006
	CONTRA COSTA	6259	884.5	913.0	164.3	984.1	2946	6404
	MARIN	1947	271.0	241.0	115.1	242.8	870	1891
	NAPA	717	36.6	183.0	42.6	159.2	401	873
	SAN FRANCISCO	3167	348.6	662.7	80.7	262.4	1354	2944
	SAN MATEO	4923	813.1	627.0	114.7	508.0	2063	4484
	SANTA CLARA	10674	1443.8	1792.2	240.5	1246.9	4723	10268
	SOLANO	2314	422.2	228.9	55.9	265.8	973	2115
	SONOMA	1922	111.7	408.2	139.3	358.5	1018	2212
SJV	FRESNO	6112	343.4	1262.7	379.8	2829.8	4816	10469
	KERN	5011	337.2	1214.0	149.4	1386.3	3087	6711
	KINGS	987	62.1	209.3	48.2	319.6	639	1389
	MADERA	1010	0.0	312.1	35.3	571.0	918	1997
	MERCED	2377	127.0	563.3	138.5	830.3	1659	3607
	SAN JOAQUIN	4776	480.3	830.3	232.4	1353.6	2897	6297
	STANISLAUS	3455	211.7	628.1	305.6	1051.4	2197	4776
	TULARE	2984	47.7	744.3	202.1	1775.1	2769	6020
SV	BUTTE	1532	25.7	362.8	123.6	458.4	971	2110
	COLUSA	495	81.2	34.9	17.9	146.8	281	610
	GLENN	404	61.0	36.3	17.8	105.9	221	480
	PLACER	2373	290.8	328.3	95.1	579.3	1294	2812
	SACRAMENTO	9056	1046.5	1598.0	328.5	1288.3	4261	9264
	SHASTA	1722	208.3	272.4	69.9	290.4	841	1828
	SOLANO	1030	187.9	101.9	24.9	118.3	433	941
	SUTTER	634	14.2	165.7	36.1	166.2	382	831
	TEHAMA	773	104.5	88.7	35.7	186.3	415	903
	YOLO	1456	227.4	157.7	42.1	312.8	740	1609
	YUBA	502	20.5	106.1	39.6	135.6	302	656
Totals		262363	34445	53590	10329	42874	141238	307062

Fraction of PM10 = 0.46 (PM10 Emissions = TSP x 0.46)

TABLE 2

1993 Roadway Travel Fractions and VMT Estimates for California Entrained Paved Road Dust Estimates

AIR BASIN	COUNTY	1993 VMT	1993 HPMS Travel Fractions			
		1993 O <sub>3</sub> SIP* (million VMT)	Freeway	Major	Collector	Local
GBV	ALPINE	52	0.000	0.767	0.123	0.110
	INYO	460	0.000	0.742	0.132	0.126
	MONO	311	0.000	0.776	0.079	0.145
LC	LAKE	420	0.000	0.639	0.164	0.197
LT	EL DORADO	343	0.000	0.790	0.050	0.160
	PLACER	158	0.427	0.335	0.097	0.140
MC	AMADOR	304	0.000	0.718	0.165	0.117
	CALAVERAS	320	0.000	0.684	0.201	0.116
	EL DORADO	1479	0.000	0.790	0.050	0.160
	MARIPOSA	226	0.000	0.718	0.117	0.166
	NEVADA	948	0.325	0.368	0.138	0.170
	PLACER	262	0.427	0.335	0.097	0.140
	PLUMAS	278	0.000	0.580	0.211	0.209
	SIERRA	92	0.129	0.470	0.129	0.272
	TUOLUMNE	511	0.000	0.619	0.225	0.156
NC	DEL NORTE	223	0.000	0.676	0.210	0.114
	HUMBOLDT	1114	0.000	0.717	0.120	0.163
	MENDOCINO	997	0.000	0.627	0.212	0.160
	TRINITY	142	0.000	0.685	0.083	0.232
	SONOMA	514	0.203	0.515	0.176	0.107
NCC	MONTEREY	3223	0.130	0.590	0.165	0.115
	SAN BENITO	375	0.000	0.798	0.065	0.137
	SANTA CRUZ	1821	0.285	0.465	0.181	0.069
NEP	LASSEN	492	0.000	0.581	0.219	0.201
	MODOC	149	0.000	0.463	0.190	0.347
	SISKIYOU	812	0.434	0.218	0.089	0.258
SC	LOS ANGELES	65793	0.437	0.458	0.054	0.051
	ORANGE	22026	0.450	0.455	0.038	0.057
	RIVERSIDE	11278	0.453	0.340	0.110	0.096
	SAN BERNARDINO	10853	0.445	0.385	0.082	0.087
SCC	SAN LUIS OBISPO	2351	0.043	0.764	0.066	0.128
	SANTA BARBARA	3105	0.303	0.510	0.124	0.064
	VENTURA	5858	0.343	0.503	0.066	0.088
SD	SAN DIEGO	23094	0.525	0.326	0.079	0.070
SED	IMPERIAL	1341	0.244	0.403	0.179	0.173
	KERN	817	0.235	0.587	0.100	0.078
	LOS ANGELES	1409	0.437	0.458	0.054	0.051
	RIVERSIDE	4780	0.453	0.340	0.110	0.096
	SAN BERNARDINO	5173	0.445	0.385	0.082	0.087
SF	ALAMEDA	9867	0.550	0.321	0.072	0.057
	CONTRA COSTA	6259	0.493	0.353	0.064	0.090
	MARIN	1947	0.485	0.300	0.143	0.072
	NAPA	717	0.178	0.551	0.144	0.128
	SAN FRANCISCO	3167	0.384	0.507	0.062	0.048
	SAN MATEO	4923	0.576	0.309	0.056	0.059
	SANTA CLARA	10674	0.471	0.407	0.055	0.067
	SOLANO	2314	0.636	0.240	0.059	0.066
	SONOMA	1922	0.203	0.515	0.176	0.107
	FRESNO	6112	0.196	0.501	0.151	0.153
SV	KERN	5011	0.235	0.587	0.072	0.106
	KINGS	967	0.224	0.525	0.121	0.131
	MADERA	1010	0.000	0.749	0.085	0.167
	MERCED	2377	0.186	0.574	0.141	0.099
	SAN JOAQUIN	4776	0.351	0.421	0.118	0.110
	STANISLAUS	3455	0.214	0.440	0.214	0.132
	TULARE	2984	0.056	0.604	0.164	0.176
	BUTTE	1532	0.058	0.574	0.196	0.172
SV	COLUSA	495	0.572	0.170	0.088	0.170
	GLENN	404	0.526	0.217	0.106	0.151
	PLACER	2373	0.427	0.335	0.097	0.140
	SACRAMENTO	9056	0.403	0.428	0.088	0.082
	SHASTA	1722	0.422	0.383	0.098	0.097
	SOLANO	1030	0.636	0.240	0.059	0.066
	SUTTER	634	0.078	0.633	0.138	0.151
	TEHAMA	773	0.471	0.278	0.112	0.139
	YOLO	1456	0.544	0.262	0.070	0.123
	YUBA	502	0.142	0.512	0.191	0.155
		State Averages				
All	Statewide Total	262363	0.252	0.500	0.119	0.123

\* The VMT for most counties is from the ARB's EMFAC/BURDEN 7F runs performed for the 1993 ozone SIPs. The VMT for the SCAQMD and SJVUAPCD was provided by each district from their local transportation agencies.



TABLE 3

Silt Loadings and Emission Factors for California Entrained Paved Road Dust Estimates

		Silt Loadings and PM <sub>10</sub> Emission Factors										Average Vehicle Weight (tons)	
AIR BASIN	COUNTY	Freeway		Major		Collector		Local		Local Rural (1)			
		Silt Load (g/m <sup>2</sup> )	EF (lbs PM <sub>10</sub> per 10 <sup>6</sup> VMT)	Silt Load (g/m <sup>2</sup> )	EF (lbs PM <sub>10</sub> per 10 <sup>6</sup> VMT)	Silt Load (g/m <sup>2</sup> )	EF (lbs PM <sub>10</sub> per 10 <sup>6</sup> VMT)	Silt Load (g/m <sup>2</sup> )	EF (lbs PM <sub>10</sub> per 10 <sup>6</sup> VMT)	Silt Load (g/m <sup>2</sup> )	EF (lbs PM <sub>10</sub> per 10 <sup>6</sup> VMT)		
GBV	ALPINE	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	INYO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	MONO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
LC	LAKE	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	EL DORADO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
LT	PLACER	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	AMADOR	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
MC	CALAVERAS	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	EL DORADO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	MARIPOSA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	NEVADA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	PLACER	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	PLUMAS	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SIERRA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	TUOLUMNE	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	NC	DEL NORTE	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4
		HUMBOLDT	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4
MENDOCINO		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
TRINITY		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
SONOMA		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
NCC	MONTEREY	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SAN BENITO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SANTA CRUZ	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
NEP	LASSEN	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	MODOC	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SISKIYOU	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
SC (2,3)	LOS ANGELES	0.020	685.5	0.037	1022.4	0.037	1022.4	0.240	3447			2.7	
	ORANGE	0.020	682.8	0.037	1018.5	0.037	1018.5	0.240	3434			2.7	
	RIVERSIDE	0.020	896.0	0.037	1336.6	0.037	1336.6	0.240	4506			3.2	
	SAN BERNARDINO	0.020	975.1	0.037	1454.5	0.037	1454.5	0.240	4904			3.4	
SCC	SAN LUIS OBISPO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SANTA BARBARA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	VENTURA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
SD	SAN DIEGO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
SED	IMPERIAL (4)	0.020	573.8	0.035	825.5	0.320	3478.8	0.320	3479			2.4	
	KERN	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	LOS ANGELES (2,3)	0.020	660.5	0.035	950.3	0.035	950.3	0.320	4004			2.6	
	RIVERSIDE (2,3)	0.020	809.3	0.035	1164.3	0.035	1164.3	0.320	4907			3.0	
	SAN BERNARDINO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
SF	ALAMEDA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	CONTRA COSTA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	MARIN	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	NAPA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SAN FRANCISCO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SAN MATEO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SANTA CLARA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SOLANO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SONOMA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SJV (5)	FRESNO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4
KERN		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
KINGS		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
MADERA		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
MERCED		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
SAN JOAQUIN		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
STANISLAUS		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
TULARE		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479	1.6	9903	2.4	
BUTTE		0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
SV	COLUSA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	GLENN	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	PLACER	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SACRAMENTO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SHASTA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SOLANO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	SUTTER	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	TEHAMA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	YOLO	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	
	YUBA	0.020	573.8	0.035	825.5	0.035	825.5	0.320	3479			2.4	

Notes for Table 3.

- (1) The SJVUAPCD splits local roads into urban and rural classes, and uses separate silt loading values.
- (2) The SCAQMD uses the median, rather than the average value of the BACM silt loading values.
- (3) The SCAQMD computed county specific vehicle weight averages. Los Angeles and Orange Counties have an average vehicle weight value of 2.7 tons. Riverside has a value of 3.2 tons, and San Bernardino is set to 3.4 tons.
- (4) In Imperial county, a silt loading value of 0.32 is used for collector roads to account for the large portion of developed areas.
- (5) The SJV district splits their local roads into urban and rural roads. A higher silt loading value derived from AP-42 data is used in computing emissions for rural local roads due to anticipated higher loading levels.



**End of Pavement at Stewart Mine Rd MP 1.0 (Project Limit East End)**



**Motorist driving truck on existing unpaved road**





**Steep Grade Next 1 Mile sign posted at MP 1.94**



**Steep grade at MP 3.21**





**End of unpaved segment at driveway to 6392 Bayne Rd (MP 3.54)**



**Start of Pavement at MP 3.54 (Project Limit East End)**



From the  
desk of

*Bill Center*

March 21, 2012

Dave Johnston  
Air Pollution Control Officer  
El Dorado County Air Quality Management District  
330 Fair Lane  
Placerville, CA 95667

Re: County of El Dorado Department of Transportation – Motor Vehicle Emissions Reduction  
Project Proposal: Bayne Road Chip Seal Project

Dear Mr. Johnston,

I am writing this letter on behalf of the residents who live on Bayne Road. This road is nearly 5 miles long, of which about 2.5 miles is currently unpaved. There are more than 30 developed residential lots along the unpaved section of Bayne Road, which is the only access road for motorists to travel west to get to Mt. Murphy Road and to travel east to get to State Route 193.

The unpaved section is in poor condition and gets very muddy during the rainy winter-spring season and very dusty during the dry summer-fall season. Residents have made numerous requests over the years to the County Department of Transportation to pave the unpaved segment. We've been told that there was no funding but that Bayne Road was at the top of the list, and would be considered should some funding become available.

The residents of Bayne Road are very supportive of the County's Motor Vehicle Emissions Reduction project proposal to chip seal the 2.5 mile of unpaved segment of Bayne Road. We hope that this project is selected for funding.

Attached are several petitions in support of this project.

Thank you for your consideration.

Sincerely,

*Bill Center*

Bill Center  
561 Toad Road  
Coloma, CA 95613



3/21/2012

ATTACHMENT H

PETITION TO CHIP SEAL BAYNE ROAD

We, the undersigned, fully support the County of El Dorado Department of Transportation's Motor Vehicle Emissions Reductions project proposal to chip seal Bayne Road.

Name	Address	Phone	Email
Robert P Day Jr	PO BOX 316 4000 Twin Ridges Rd	530 642-8187	bob@maddogmesa.com
Amy Anderson Biny	PO Box 316 4000 Twin Ridges Rd	530 642-8187	amy@maddogmesa.com
Marcia Levitt	P.O. Bx 405 310 Bayne Ct.	530 - 626-3017	marciaandray@earthlink.net
Jan Cloud	337 Bayne Ct.	295 1802	—
Robert Cloud	" " "	"	—
Ronald Wolfelot	311 Mules Ear Rd.	344-0880	
Michael Bergman	6875 Bayne Rd.	626-8681	
Barbara Bergman	6875 Bayne Rd.	626-8681	
David Boerschingen	6777 Bayne rd.	530 - 748-6110	
John Gallucci	6777 Bayne rd.	621-0860	
RON FAGOT	7124 Bayne rd.	621-0860	
Sandy Robinson	7140 Bayne rd.	621-4058	
Sheryl Dinala	7265 Bayne Rd.	621-0257	
Kim Green	6860 Bayne Rd.	622-4102	



3/21/2012

PETITION TO CHIP SEAL BAYNE ROAD

We, the undersigned, fully support the County of El Dorado Department of Transportation's Motor Vehicle Emissions Reductions project proposal to chip seal Bayne Road.

Name	Address	Phone	Email
Michael Walborn	6821 Bayne Rd. Kelsey CA,	530 748-7997	
Joseph Peterson	6720 BAYNE RD	530 622-4566	
Josh Sinclair	6735 BAYNE RD.	530 919 4504	
Raymond Willett	310 Bayne Ct	530 626- 3017	marciaandray@ earthlink.net
Judith Gossett	7201 Stewart Mine Rd.	530-622	judith@arconceivancy.org
Judith Gossett	Kelsey, CA 95667	7945	judith.gossett@ sbcglobal.net
BM Center	561 Toad Road, Coloma	530 622 4742	bcbotus@innecite.com
Robin Center	561 toad road, coloma	530 622 4742	bcbotus@innecite.com
Jim Klotz	381 Mules Ear Rd. Coloma, CA	530-919 8180	guitar ten11@gmail. com
Alice Butler	385 Coloma Heights Rd. Coloma, CA 95613	530-295- 1688	alicevirginiabutlev@ gmail.com
Deb Dohm	380 Mules Ear Rd. Coloma 95613 - property owned	(415)234- 6834	djdenada@ gmail.com
James Likowski	9 Duarte Ct., Novato, CA 94949	415/234- 6834	djdenada@ gmail.com
James B. Likowski	380 Mules Ear Rd, Coloma CA 95613 - property owned	415/234- 6834	djdenada@ gmail.com
Opstater	6830 Bayne Rd	344-9305	barberswife@ hughes.net
Al Potts	6830 Bayne Rd	"	"
Jayce Thompson	7101 Bayne Rd	626-5520	jthomp98@ yahoo.com



**PETITION TO CHIP SEAL BAYNE ROAD**

We, the undersigned, fully support the County of El Dorado Department of Transportation's Motor Vehicle Emissions Reductions project proposal to chip seal Bayne Road.

Name	Address	Phone	Email
David Thomas	PO Box 24 Coloma 594 Toad Rd	530-306-8756	thomasdavid@mae.com
Leo	9001		
Lallo & deanda			
Jack 3	6760 Bayne	530 622 7748	
Barbara Thomas	Box 24 594 Toad Rd	530-503-5715	barbarathomas@mae.com

**Fax Cover sheet**

**To: Anne Novotny @ 530 626 0387.  
El Dorado County DOT**

**From: Valeri Heer**

**Date: 3/22/2012**

**Attached: Petition to Chip Seal Bayne Road**

**I have submitted the attached petition signed by people who use Bayne Road and would be delighted to see it chip/sealed. We have been here over 15 years and have continued to encourage DOT to repair Bayne Road.**

**Please push full speed ahead and let me know if I can do anything to assist you in this endeavor.**

## PETITION TO CHIP SEAL BAYNE ROAD

**We, the undersigned, fully support the County of El Dorado Department of Transportation's Motor Vehicle Emissions Reductions project proposal to chip seal Bayne Road.**

Name	Address	Phone	Email
Valeri Heer	500 AVE. Chateau Kelsey CA	530 622 3303	valeri@chateautraib
Rand Heer	500 AVE. Chateau Kelsey CA	530 622 3303	valeri@chateautraib
Mike Moravetz	3720 Springer Rd Placerville CA	530 621 4918	none
Beverly Feusi	7227 Dead Horse Rd. Placerville CA	530 626 3067	feusil@yahoo.com
Jim Feusi	7227 Dead Horse Rd. Placerville CA	530 626 3067	feusil@yahoo.com
Ben Feusi	7227 Dead Horse Rd. Placerville CA	530 621- 2147	pillowthief.@yahoo.com
April Feusi	7227 Dead Horse Rd. Placerville CA	530 621- 2147	April.Feusi@gmail.com