

## Appendix F: Paved and Unpaved Road Dust

### *1996 and 2018 Inventories for Re-entrained Road Dust From Paved and Unpaved Roads*

Paved and unpaved road dust emissions in the WRAP states were estimated to determine if road dust has an effect on visibility in each of the 16 Colorado Plateau Class I areas. In brief, paved road dust emissions were estimated using the standard EPA approach, while unpaved road dust emissions were estimated using revised silt contents, revised activity data, and transport fractions. Paved and unpaved road dust PM<sub>10</sub> and PM<sub>2.5</sub> emissions by state for 1996 and 2018 are provided in Tables 45 and 46. Paved road dust emissions increase by about three percent per year from 1996 to 2018, per the increase in vehicle miles traveled. The increase varies by state, with the largest projected growth in vehicle travel in Washington, Idaho, and Utah. Unpaved road dust emissions are projected to decrease between 1996 and 2018, by about 0.75% per year, because of reductions in unpaved road mileage over time as more roads are paved. As a result, unpaved road dust emissions are about 80% of road dust PM<sub>10</sub> emissions in 1996, and about 65% of road dust PM<sub>10</sub> emissions in 2018. Overall, road dust PM<sub>10</sub> emissions increase by about 6% from 1996 to 2018.

**Table 45: 1996 WRAP States Fugitive Road Dust Emissions (TPY)**

State	Paved Road Dust		Unpaved Road Dust		Total Road Dust	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Arizona *	7,318	1,830	18,605	2,791	25,923	4,620
California *	35,643	8,911	86,474	14,090	122,117	23,001
Colorado *	7,897	1,974	30,601	4,590	38,498	6,564
Idaho *	3,502	876	28,304	4,246	31,806	5,121
Montana	2,909	727	15,796	2,369	18,705	3,097
Nevada *	2,528	632	9,460	1,449	11,988	2,081
New Mexico *	5,395	1,349	27,972	4,196	33,367	5,545
North Dakota	2,461	615	34,419	5,163	36,880	5,778
Oregon *	8,067	2,017	19,078	2,862	27,144	4,878
South Dakota	2,296	574	46,199	6,930	48,495	7,504
Utah *	3,680	920	16,040	2,406	19,721	3,326
Washington	7,804	1,951	34,365	5,155	42,169	7,106
Wyoming *	1,823	456	3,449	517	5,271	973
13 states total	91,322	22,831	370,762	56,763	462,084	79,594
* 9 GCVTC States	75,853	18,963	239,983	37,146	315,835	56,109

**Table 46: 2018 WRAP States Fugitive Road Dust Emissions (TPY)**

State	Paved Road Dust		Unpaved Road Dust		Total Road Dust	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Arizona *	12,618	3,154	12,976	1,945	25,594	5,099
California *	59,794	14,950	56,447	9,198	116,242	24,148
Colorado *	13,771	3,442	36,956	5,544	50,728	8,986
Idaho *	7,548	1,887	17,976	2,697	25,524	4,584
Montana	4,796	1,201	17,907	2,686	22,703	3,887
Nevada *	5,019	1,256	7,198	1,102	12,217	2,358
New Mexico *	10,198	2,551	32,730	4,909	42,928	7,461
North Dakota	3,723	931	34,255	5,139	37,978	6,070
Oregon *	14,684	3,672	12,158	1,825	26,842	5,497
South Dakota	3,723	931	50,239	7,537	53,962	8,468
Utah *	7,541	1,883	20,487	3,073	28,028	4,957
Washington	18,681	4,668	22,991	3,449	41,672	8,118
Wyoming *	3,019	756	3,719	558	6,738	1,314
13 states total	165,115	41,282	326,040	49,666	491,155	90,947
* 9 GCVTC States	134,192	33,551	200,648	30,853	334,840	64,404

*Road Dust significance analysis and finding for the Colorado Plateau 16 Class I areas*

Section 309 of the Regional Haze Rule requires the following for Road Dust:

*Area sources of dust emissions from paved and unpaved roads. The plan must include an assessment of the impact of dust emissions from paved and unpaved roads on visibility conditions in the 16 Class I Areas. If such dust emissions are determined to be a significant contributor to visibility impairment in the 16 Class I areas, the State must implement emissions management strategies to address the impact as necessary and appropriate.*

As described above, road dust emissions inventories were developed, and the significance of road dust was then tested using the regional air quality model at the Regional Modeling Center. The modeling results are presented in Table 47, below.

**Table 47: Road Dust Significance Modeling Results**

Colorado Plateau Class I Areas	2018 Base Case (Mm <sup>-1</sup> )	2018 No Road Dust (Mm <sup>-1</sup> )	EPA Natural Conditions Worst 20% Days (Mm <sup>-1</sup> )	Bext change No Road Dust (Mm <sup>-1</sup> )	Bext change No Road Dust (%)	dv Change No Road Dust (dv)
Arches NP	25.91	25.63	20.12	0.29	1.42	0.14
Black Canyon of Gunnison NP	32.84	32.20	20.26	0.63	3.13	0.31
Bryce Canyon NP	24.24	23.99	20.12	0.25	1.24	0.12
Canyonlands NP	23.89	23.71	20.08	0.18	0.89	0.09
Capitol Reef NP	25.56	25.30	20.18	0.26	1.29	0.13
Flat Tops Wilderness	28.55	28.37	20.28	0.19	0.92	0.09
Grand Canyon NP	27.78	27.53	20.08	0.25	1.22	0.12
Maroon Bells-Snowmass Wilderness	31.78	31.46	20.30	0.32	1.57	0.16
Mesa Verde NP	34.47	34.21	20.18	0.26	1.30	0.13
Mount Baldy Wilderness	41.63	41.26	20.04	0.37	1.87	0.19
Petrified Forest NP	32.46	32.22	20.08	0.24	1.20	0.12
San Pedro Parks Wilderness	28.90	28.65	20.18	0.24	1.21	0.12
Sycamore Canyon Wilderness	35.34	34.95	20.34	0.39	1.92	0.19
West Elk Wilderness	31.15	30.85	20.26	0.30	1.47	0.15
Weminuche Wilderness	29.93	29.77	20.20	0.16	0.80	0.08
Zion NP	25.57	24.95	20.06	0.61	3.05	0.30

In the regional model, the road dust inventory was set to zero for the entire modeling domain, other 2018 base case emissions were included as normal, and the resulting modeled effect of road dust emissions were calculated in terms of the impact on visibility at each of the 16 Colorado Plateau Class I areas, on the predicted worst 20% days. The modeled regional impact of road dust emissions ranged from 0.31 deciviews (3.1% of natural conditions to be reached by 2064) at the Black Canyon of the Gunnison National Park to 0.08 deciviews (0.8% of natural conditions to be reached by 2064) at the Weminuche Wilderness. These data were presented and discussed by WRAP's Modeling and Mobile Sources Forums, the Oversight Committees, and the Board of Directors, and all agreed that the regional impacts of road dust emissions are not significant at the 16 Colorado Plateau Class I areas at this time.

The Board of Directors directed the Technical Forums to continue to track and evaluate road dust emissions, as dust aerosols have been shown to be an important contributor to visibility impairment at many WRAP region Class I areas. The finding of no significance is a rigorous test, as no windblown dust emissions are included in the model, so the modeled significance of road dust is not masked by a large mass of other dust emissions.