PAVED ROAD DUST

1990 Average Daily Traffic (ADT) and Daily Vehicle Miles Traveled (DVMT) data was obtained from the Spokane Regional Council (SRC) for travel in the nonattainment area. It was decided to calculate emissions according to ADT volume classes based on silt loading source testing and references 3 and 6.

The equation used to generate an emission factor was taken from AP42, 11.2.5.2: $e = k\ (sL/0.7)^p$ [lb/VMT]

where k = 0.0081 lb/VMT (AP42, Table 11.2.5-1 for PM_{10}),
p = 0.8 (AP42 Table 11.2.5-1 for PM_{10}),
sL = determined for each ADT class, gr/ft^2

Emissions below are shown for lbs/day (ppd) and tons/year (tpy).

ADT Class	DVMT	k (lb/VMT)	p	sL	e	PM_{10} ppd	PM_{10} tpy
< 150	0	0.0081	0.8	1.73	0.0167	0	0
150-900	5,470	0.0081	0.8	1.43	0.0144	79	14
900-2150	31,130	0.0081	0.8	0.72	0.0083	257	47
2150-3500	38,113	0.0081	0.8	0.29	0.0040	151	28
3500-5000	95,175	0.0081	0.8	0.14	0.0023	217	40
5000-6200	115,900	0.0081	0.8	0.07	0.0013	152	28
> 6200	6,667,009	0.0081	0.8	0.06	0.0011	7,588	1,385
totals	6,952,797					8,443	1,541

Annual emissions were estimated at 1,541 tons.

References:

1. AP42, Section 11.2.5, Table 11.2.5-1 (9/85).

2. Spokane Regional Council 1990 daily VMT data.

3. Street Sanding Emissions and Control Study. PEI Associates, Inc. 11499 Chester Road. Cincinnati, Ohio 45246. Prepared for EPA, Air and Toxics Division. October 1989.

4. "Denver Demonstration Study." PEDCo Environmental, Inc. Prepared for the Colorado Division of Air Pollution Control. October 1981.

5. Hanrahan, P.L., Oregon Department of Environmental Quality. Interoffice memorandum to M.J. Zollitsch Through J.F. Kowalczyk, "Documentation of PM_{10} Paved Road Dust Emission Factor," October 13, 1987.

6. Clint Bowman - Dispersion modeling, WA Dept. of Ecology.

7. Control of Open Fugitive Dust Sources. EPA 450/3-88-008, Sept. 1988, Section 2.0.

UNPAVED ROAD AND PARKING LOT DUST

1990 Daily vehicle miles traveled (VMT) on unpaved roads by surface type was obtained from the Spokane Regional Council (SRC) for travel in the nonattainment area. Total VMT for upaved parking lots was determined by a survey conducted by SRC and SCAPCA (ref. 4).

Speeds were provided by SRC. A control efficiency of 90% was assumed for oiling. Percent silt for each of the surface types was taken from AP42, Table 11.2.1-1. An average for gravel and dirt was used for unpaved parking lots and for the category "Unpaved." The equation used to generate an emission factor was taken from AP42, 11.2.1.2:

$$e = k\ (5.9)(s/12)(S/30)(W/3)^{0.7}(w/4)^{0.5}(365-p/365) \quad [lb/VMT]$$

where k = 0.36 lb/VMT (AP42, section 11.2.1.2 for PM_{10}),
s = silt content of road surface, %
S = 17.5, mean vehicle speed, mph
W = 3, mean vehicle weight, Tons
w = 4, mean number of wheels
p = 113, number of days with at least 0.01 inches of precip. per year

Variables for this equation are characteristic of light duty vehicles since they produce most of the VMT on the unpaved roads.

Surface	DVMT	k	s	S	W	w	p	e	Ctrl Eff.	PM_{10} ppd	PM_{10} tpy
(Untreated)											
Native	157	0.36	28.5	17.5	3	4	113	2.0316	0.00	319	58
Dirt	181	0.36	28.5	17.5	3	4	113	2.0316	0.00	368	67
Unimproved	1,811	0.36	28.5	17.5	3	4	113	2.0316	0.00	3,679	671
Gravel	20,947	0.36	5.0	17.5	3	4	113	0.3564	0.00	7,466	1,363
Unpaved	7,335	0.36	12.0	17.5	3	4	113	0.8554	0.00	6,274	1,145
(Oiled)											
Native	132	0.36	28.5	17.5	3	4	113	2.0316	0.90	27	5
Dirt	292	0.36	28.5	17.5	3	4	113	2.0316	0.90	59	11
Unimproved	13	0.36	28.5	17.5	3	4	113	2.0316	0.90	3	0
Gravel	309	0.36	5.0	17.5	3	4	113	0.3564	0.90	11	2
Parking Lots	838	0.36	12.0	10.0	3	4	113	0.4888	0.00	410	75
totals	32,015									18,616	3,397

Annual emissions were estimated at 3,397 tons.

References:

1. AP42, Section 11.2.1.2

2. Spokane Regional Council, 1990 daily VMT data.

3. "Normals, Means and Extremes" Local Climatological Data 1988. Average number of days of precipitation in Spokane.

4. Spokane County Air Pollution Control Authority/Spokane Regional Council unpaved parking lot survey, 1988.

5. Control of Open fugitive Dust Sources. EPA 450/3-88-008, Sept. 1988, Section 3.0.

AGRICULTURAL FIELD BURNING

Grass Seed Fields

Grass seed field burning is regulated by SCAPCA (SCAPCA Regulation I, Section 6.10). Burning of fields is not allowed if meteorological conditions exist which would allow smoke to enter the PM_{10} nonattainment area. Meteorological conditions under which burning would be allowed include if the wind is from the southwest with speed greater than 2-7 mph and less than 20 mph. Generally burning would be very limited if wind speeds were as low as 2 mph. More often burning would be allowed only if wind speeds were 7 mph or greater. Burning occurs in mid to late August or early to mid September, and is allowed Monday through Thursday daytime only.

In 1990, 29,501 acres of field forage and turf grass fields were granted permits from the Spokane County Air Pollution Control Authority (SCAPCA) for burning. Other SCAPCA records indicate that 27,533 acres were actually burned during the last half of August and the first half of September. Within the nonattainment area, about 117 acres were burned.

Countywide, growers report that the average amount of straw and stubble on the fields during burning is 1.5 tons per acre. This figure and the AP42 emission factor (Table 2.4-5) for grasses were used to calculate emissions.

Grain Stubble Fields

Grain stubble burning within Spokane County is widely recognized as a poor agricultural practice and is strictly limited. Justification for any burning must be presented to the SCAPCA before a permit is issued. However, agricultural operations are allowed to burn areas of one acre or less without a permit from SCAPCA. In 1990, no grain stubble fields were burned legally in the nonattainment area; therefore emissions are expected to be negligible.

Countywide, a review of SCAPCA permit files for 1990 indicates that 85 acres of wheat stubble were burned in September. Loading in T/acre and the emission factor for backfiring on wheat fields (Table 2.4-5) were used to calculate emissions.

An educated guess for illegal stubble burning would increase the county-wide emissions from 1 to 5-10 tons per year.

Field Weed Burning

Countywide field weed burning in 1990 covered an area of 116 acres per the SCAPCA records. Agricultural operations are allowed to burn one acre or less without a permit. About 11.25 acres of weed fields were burned in the nonattainment area in 1990 during March and April. It should be noted that these fields were burned under special burning permits, and the fields were only allowed to be burned if meteorological conditions were such that the nonattainment area would not be impacted. Loading and emission factor were taken from AP42 Table 2.4-5 for unspecified weed burning.