

Summary of WRAP In and Near Forum Report:

**Evaluation of PM10 SIPs
and Their Applicability to Visibility Control
in Western Class I Areas**

Contractors:

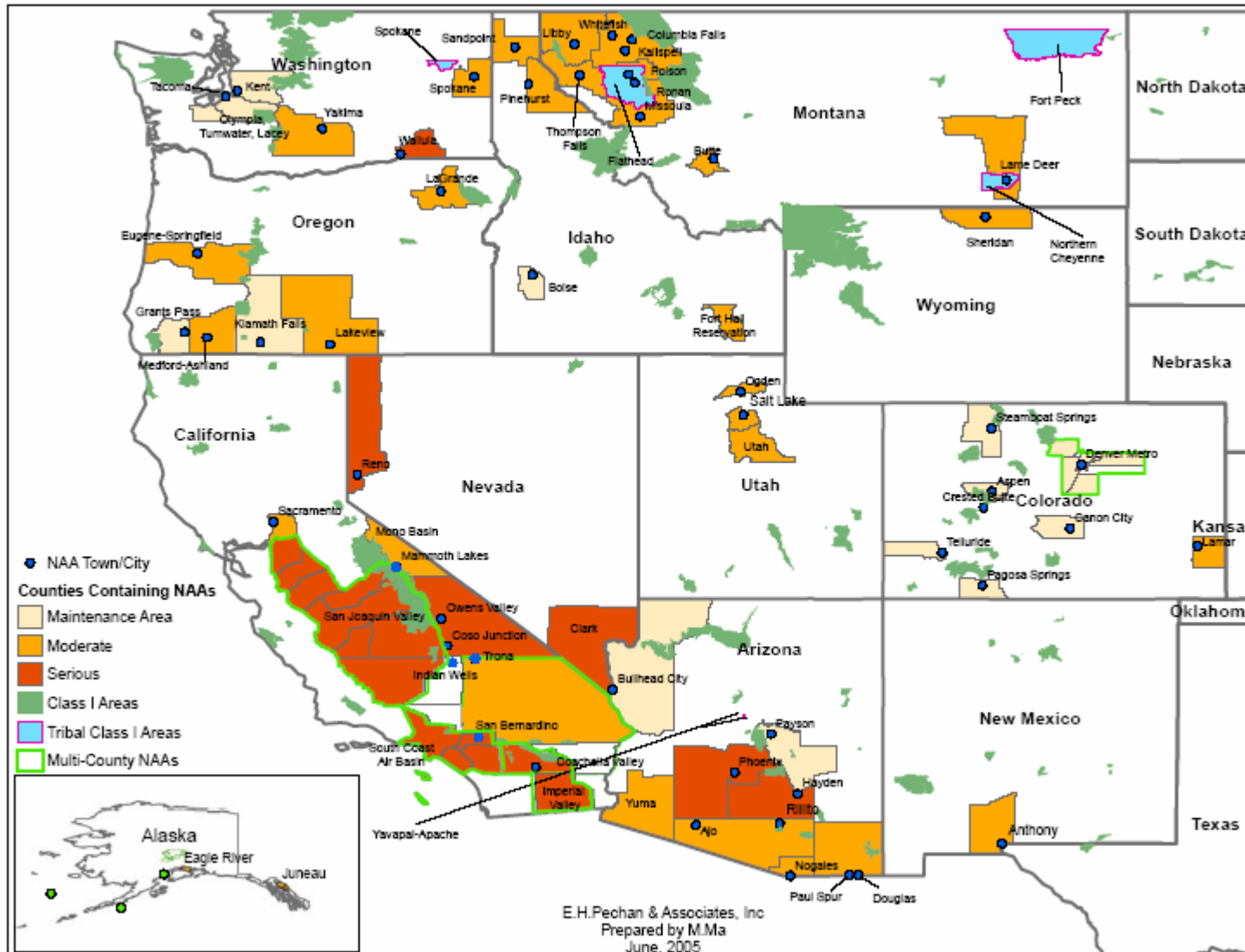
E.H. Pechan & Associates

Air Resource Specialists

Purpose

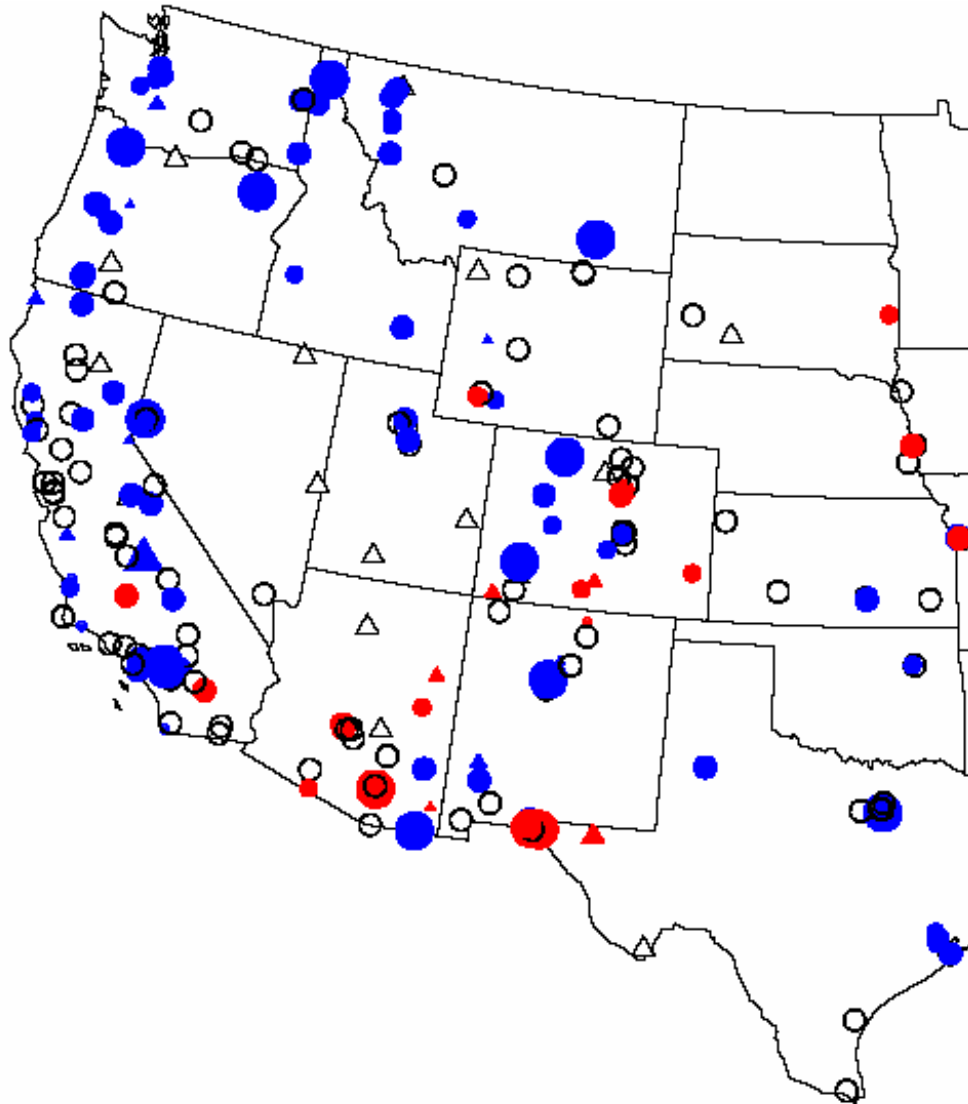
- Identify and evaluate historically successful efforts to reduce PM_{10} in nonattainment areas (NAAs), which may be applicable to controlling visibility-impairing emissions at or near Federal and Tribal Class I areas

Step 1: Identify PM10 Nonattainment and Maintenance Areas



69 areas identified in WRAP region, plus another 2 areas were considered.

Step 2: Based on Ambient Trends and Staff Interviews, Identify 25 Areas for Further Review



PM10 Trends at IMPROVE Sites and Sites in AIRS

AQS IMPROVE

- | | | |
|---|---|--|
| ● | ▲ | > 1.0 ug/m ³ /yr decrease |
| ● | ▲ | 0.50-1.0 ug/m ³ /yr decrease |
| ● | ▲ | 0.25-0.50 ug/m ³ /yr decrease |
| ● | ▲ | 0.00-0.25 ug/m ³ /yr decrease |
| ○ | △ | No trend |
| ● | ▲ | 0.00-0.25 ug/m ³ /yr increase |
| ● | ▲ | 0.25-0.50 ug/m ³ /yr increase |
| ● | ▲ | 0.5-1.0 ug/m ³ /yr increase |
| ● | ▲ | >1 ug/m ³ /yr increase |

Description of 25 Areas Selected for Further Review

Nonattainment Area	State	PM ₁₀ Designation	NAA Category	PM ₁₀ Planning Season	Primary Control Measures Implemented
Juneau	Alaska	Moderate	Lim. Anthro. Source	Winter	Unpaved Road Dust: road paving. RWC: public education program, episodic curtailment, opacity standard.
Mohave Co. (Bullhead City)	Arizona	Maintenance Area	Lim. Anthro. Source	Spring - Summer	Unpaved Road Dust: road paving; Windblown Dust: control of storage piles.
Phoenix	Arizona	Serious	Urbanized	Spring - Summer	Paved Road Dust: street sweeping; Fugitive Dust: wide variety of controls (see Section B2). Other Sources: include commercial charbroiling; reformulated gasoline use.
Yuma	Arizona	Moderate	Natural Events-Driven	Spring - Summer	BACM for anthropogenic sources applied to the Salt River Area in Phoenix are being evaluated for use (construction activities, paved/unpaved road dust, onroad vehicles).
Los Angeles South Coast Air Basin	California	Serious	Urbanized	Fall-Winter	Has targeted both primary and secondary PM sources – primary: paved and unpaved roads, storage piles, disturbed vacant land, and other sources. Secondary PM covered include sources of ammonia, sulfur dioxide, and nitrogen oxides.
Coachella Valley	California	Serious	Lim. Anthro. Source	Summer	Covered within the South Coast Air Quality Plan. Important sources are fugitive dust – same as those listed above.
Mammoth Lakes	California	Maintenance Area	Lim. Anthro. Source	Winter	RWC – limit number of RWC appliances; change-out requirement upon sale; public awareness program. Paved Road Dust – street sweeping program.
Aspen	Colorado	Maintenance Area	Lim. Anthro. Source	Winter	Paved Road Dust – street sanding controls, street sweeping, transit measures; Controls on RWC.
Denver Metro	Colorado	Maintenance Area	Urbanized	Winter	Paved Road Dust – street sanding controls, street sweeping, transit measures; Controls on RWC.
Telluride	Colorado	Maintenance Area	Lim. Anthro. Source	Winter	Paved Road Dust – street sanding controls, street sweeping; Controls on RWC.
Crested Butte	Colorado	Attainment	n/a	n/a	Like other mountain resort communities, PM problems occur in winter. 1988-89 RWC – change-out program.
Boise	Idaho	Maintenance Area	Urbanized	Winter	Controls on RWC, open burning, and select industrial sources.
Bonner (Sandpoint)	Idaho	Moderate	Lim. Anthro. Source	Winter	Controls on RWC, paved road dust, and a small number of industrial sources.
Missoula	Montana	Moderate	Complex Source	Winter	Controls on Paved Road Dust and RWC.

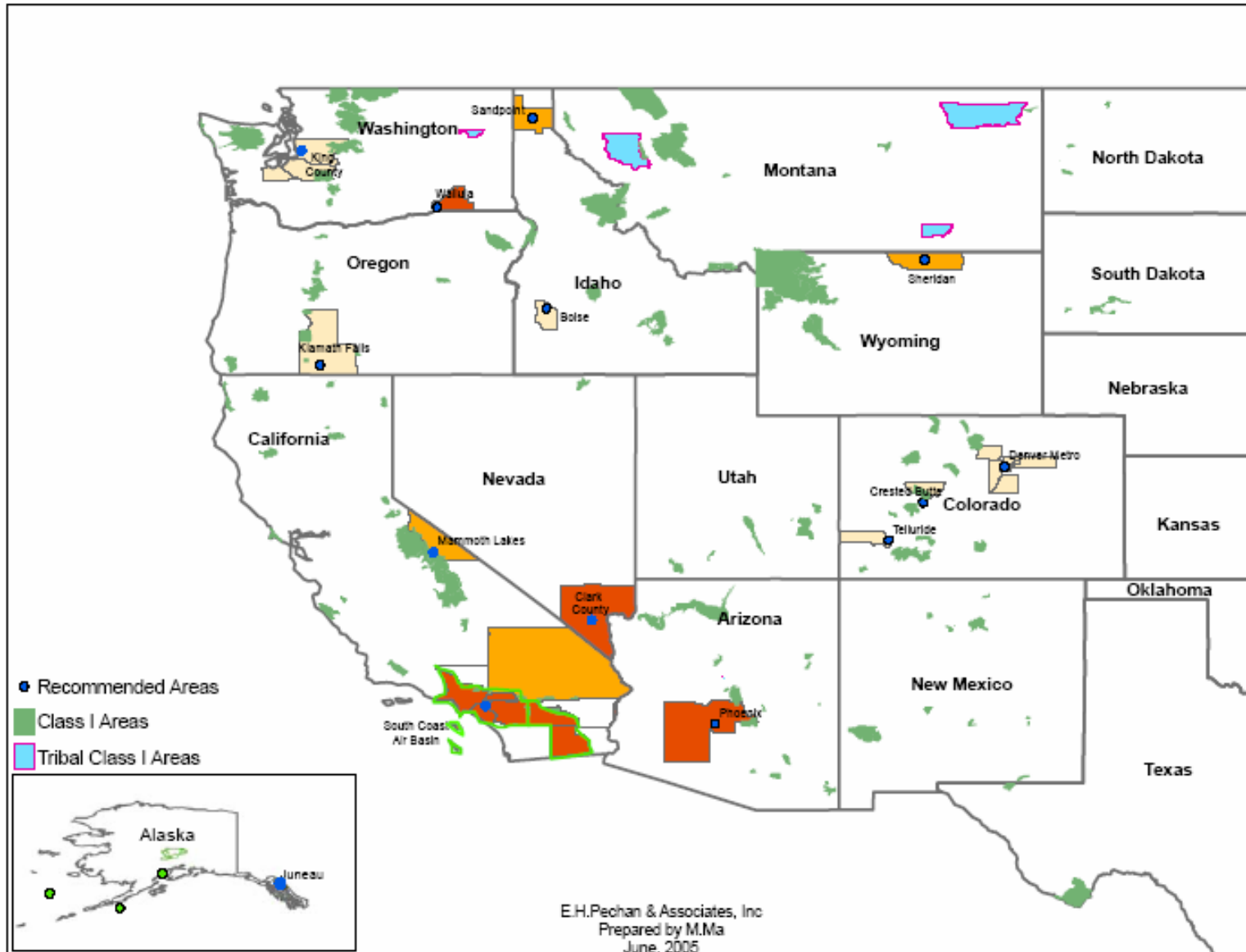
Description of 25 Areas (continued)

Nonattainment Area	State	PM ₁₀ Designation	NAA Category	PM ₁₀ Planning Season	Primary Control Measures Implemented
Clark County	Nevada	Serious	Lim. Anthro. Source	Spring - Summer	Fugitive Dust (construction activities, paved and unpaved roads, and disturbed vacant areas – variety of control measures.
Albuquerque	New Mexico	Attainment	n/a	n/a	Controls focused on a local area within the city influenced by industrial/construction activity. Controls were tailored to each source identified as a potential contributor to the local monitoring results. Controls included street sweeping and reducing drag out from industrial/construction areas.
Klamath Falls	Oregon	Maintenance Area	Lim. Anthro. Source	Winter	RWC: statewide woodstove certification program; woodstove removal/replacement program; mandatory woodstove and open burning curtailment ordinance; Paved Road Dust: winter road sanding controls; Multiple Sources: public education programs; Industrial Sources: significant emission rate requirement; Open Burning: forestry slash burning emission reduction and restriction.
Lakeview	Oregon	Moderate	Lim. Anthro. Source	Winter	RWC: statewide woodstove certification program; woodstove removal/replacement program; mandatory woodstove curtailment ordinance; Paved Road Dust: winter road sanding controls; Open Burning: forestry slash burning emission reduction and restriction.
La Grande	Oregon	Moderate	Lim. Anthro. Source	Winter	RWC and Paved Road Dust Programs similar to the above Oregon areas.
Salt Lake County	Utah	Moderate	Complex Source	Winter	Solid Fuel Burning Devices: S and ash content limits for coal, RWC curtailment program. Industrial sources: RACM limits for existing sources; natural gas use in winter, instead of coal.
Olympia, Tumwater, Lacey	Washington	Maintenance Area	Lim. Anthro. Source	Winter	RWC: curtailment program, a public education program, emission standards for new woodstoves, and restrictions on certain fuels.
King County	Washington	Maintenance Area	Complex Source	Winter	RWC: banning the sale uncertified wood stoves, establishing opacity limitations, prohibiting the burning of certain fuels, and establishing a curtailment program; Industrial Sources: various control programs.
Spokane	Washington	Moderate	Complex Source	Winter	Controls on RWC and Paved Roads.
Wallula	Washington	Serious	Lim. Anthro. Source	Spring - Summer	Controls on Agricultural Wind-Blown Dust.
Sheridan	Wyoming	Moderate	Lim. Anthro. Source	Winter	Paved Road Dust: application rates, traction material specifications, street sweeping.

Step 3

- Of the 25 areas, select 14 for in-depth analysis representing an array of PM₁₀ sources and control measures.
- In selecting these 14 areas, also consider ...
 - Degree and extent of ambient PM₁₀ trends
 - Geographic location (to achieve adequate coverage across the region)
 - Type of nonattainment problem (e.g., dust vs smoke)
 - Planning season (e.g., winter vs annual)
 - Available documentation

14 Areas Selected for In-Depth Analysis



Description of 14 Areas Selected for In-Depth Analysis

PM ₁₀ Area	State	PM ₁₀ Designation	NAA Category ^a	Planning Season	Comments ^b
Juneau	AK	Moderate	Lim. Anthro. Source	Winter	Strong negative ambient trends show effectiveness of unpaved road and RWC controls (primary sources of PM ₁₀). Small city to rural land use.
Phoenix	AZ	Serious	Urban.	Spring-Summer	Most sites do not show negative PM ₁₀ trends; however, the area is a rich source for recent control measure information. Fugitive dust sources (especially construction) dominate. Large city land use.
Los Angeles (South Coast Air Basin)	CA	Serious	Urban.	Summer	Decreasing ambient trends at most sites; only area to look at both primary and secondary PM measures; complex mixture of urban sources; Large city land use.
Mammoth Lakes	CA	Maintenance Area	Lim. Anthro. Source	Winter	Negative ambient trends; residential wood combustion (RWC) and paved road dust are primary sources targeted by controls; Resort town land use.
Denver Metro	CO	Maintenance Area	Urban	Winter	Negative trends in 99 th percentile at 6 of 17 sites; only 1 in 17 shows negative annual avg. trend; RWC, paved road dust, vehicles, and industrial sources are the most important and subject to control programs. Large city land use..
Telluride	CO	Maintenance Area	Lim. Anthro. Source	Winter	Negative ambient trends both in 99 th percentile and annual average. Paved road dust and RWC important sources being controlled. Resort town land use.
Crested Butte	CO	Attainment	n/a	Winter	In 1 of 3 monitors, 24-hr trends is moving positive; all other indicators show negative trends. Special study conducted in 1990 on the efficiency of an RWC change-out program.
Boise	ID	Maintenance Area	Urbanized	Winter	PM ₁₀ concentration trends are negative. Another example of success achieved in a more urbanized area.
Bonner (Sandpoint)	ID	Moderate	Lim. Anthro. Source	Winter	Strong negative 99 th percentile and annual trends. RWC and paved road dust were the primary sources controlled.
Clark County	NV	Serious	Lim. Anthro. Source	Spring-Summer	9 of 18 monitors show negative 99 th percentile trends; 3 of 18 show negative annual trends. This area is a good source of information on implementing fugitive dust controls in rapidly growing areas.
Klamath Falls	OR	Maintenance Area	Lim. Anthro. source	Winter	Significant negative ambient PM ₁₀ trend shows effectiveness of control programs.
King County	WA	Maintenance Area	Complex Source	Winter	Strong negative ambient trends at nearly all sites.
Walla Walla	WA	Serious	Lim. Anthro. Source	Spring-Summer	No decreasing trends; also recent 24-hr exceedances; however, it might be the best area for agricultural tilling controls.
Sheridan	WY	Moderate	Lim. Anthro. Source	Winter	Negative ambient trends (both annual and 99 th percentile); good area to establish effectiveness of paved road dust controls.

^a See TM#1 (Appendix A) for a description of the NAA categories. Most of the WRAP areas were categorized as limited anthropogenic source-driven areas.

^b TM#2 (Appendix B) provides details on the initial review of ambient data used to assist in the selection of these 14 recommended areas.

Step 4: Describe Ambient Trends, Control Measures, and Apparent Relationship

Juneau, AK

Long Term PM₁₀ Trends

F Dryden Jr High/Mendenhall Loop Rd (AQS ID 02-110-0004)

Seasonal Average PM₁₀ Concentration

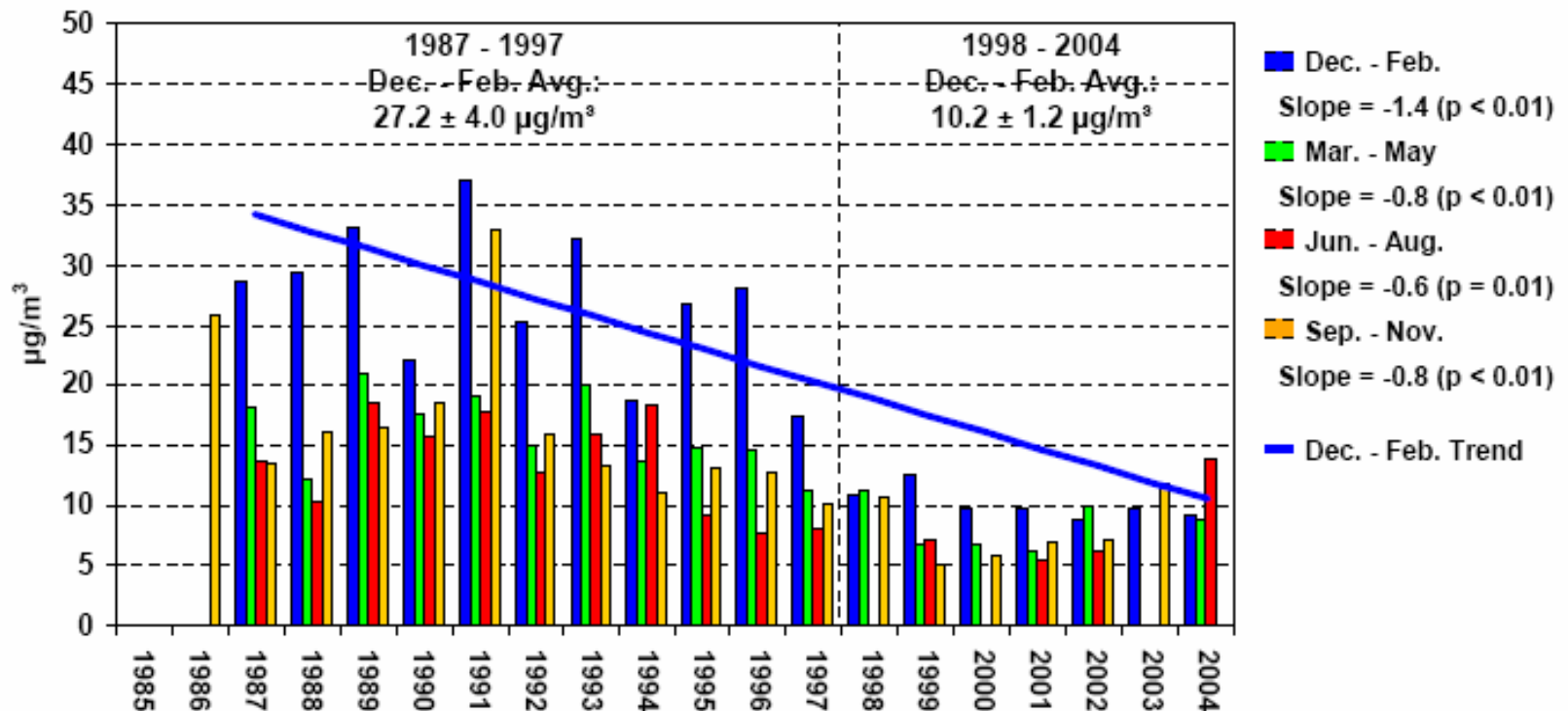


Table III-1. RWC Regulatory Program History in Juneau

Date	Control Element
Summer 1982	State regulations adopted; 75% opacity standard during announced air alerts.
Summer/Fall 1983	State and city regulations adopted; RWC control area established; 50% opacity limit for all periods; no open burning November–March; air emergency shuts down all devices; air emergency level set at 260 $\mu\text{g}/\text{m}^3$ total standard particulate (TSP); 2-year waiver to replace wood as sole heat source in homes.
Fall 1984	City reduces air emergency level to 150 $\mu\text{g}/\text{m}^3$.
Fall 1986	City ordinance revised; 2-stage episode plan adopted; air alerts shut down all but Class I stoves; Class I stoves must meet State of Oregon certification limits (6 grams/PM-hr); Class I stoves must meet 10% opacity during alerts and have a permit; air emergencies shut down all devices; air alert level set at 100 $\mu\text{g}/\text{m}^3$ TSP; air emergency level set at "anticipated to exceed 100 $\mu\text{g}/\text{m}^3$ following an alert.
Fall 1988	City ordinance revised for PM10; air alert level set at 92 $\mu\text{g}/\text{m}^3$ PM10; air emergency level set at >92 $\mu\text{g}/\text{m}^3$ PM10 following an air alert; woodstove emission limit set at as the New Source Performance Standard (NSPS) limit.
Winter 1992	City ordinance revised for PM10; air alert set at 75 $\mu\text{g}/\text{m}^3$ PM10; fines for violations of ordinance increased; Class I woodstove permits set to expire 7/1/97 (owner must reapply for a new permit).

Step 5: Explore Control Measure Transfer Opportunities Between PM₁₀ Programs and Regional Haze Programs

Table IV-1. Relative Visibility Impacts of Primary PM Emissions from Several Source Sectors

Source Sector	Fine PM Weight Fraction ^a					Coarse Mass	Relative Impact per $\mu\text{g}/\text{m}^3$ (b_{ext})
	OC	EC	SO ₄	NO ₃	Soil ^b		
Gasoline Vehicle Exhaust	0.594	0.164	0.005	0.0006	0.034	0.072	4.8
Forest Fires/ Rx Burns	0.754	0.023	0.004	0.0157	0.002	0.111	4.2
Diesel Vehicle Exhaust	0.197	0.308	0.010	0.0023	0.008	0.080	4.0
RWC	0.529	0.024	0.003	0.0040	0.000	0.037	3.2
Construction Soil	0.065	0.004	0.005	0.0006	0.348	0.394	1.0
Agricultural Soils	0.043	0.005	0.005	0.0008	0.442	0.778	0.8
Unpaved Road Dust ^c	0.054	0.003	0.007	0.0015	0.416	0.788	0.8
Paved Road Dust ^d	0.123	0.019	0.007	0.0011	0.361	0.831	0.8

^a Fine and coarse mass fractions do not sum to one. Among the reasons for this – the fine PM species have not been transformed into their assumed chemical compounds (e.g., ammonium nitrate, ammonium sulfate, metal oxides, organic material). However, this transformation was performed to estimate the relative impact.

^b Soil elements include silicon, iron, titanium, calcium, and aluminum.

^c Composite PM profile based on profiles from several western States.

^d Composite of over 100 PM profiles; not specific to resuspension of winter sanding materials, construction track-out, or urban paved road dust.