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Air

EPA

Errata for:

National Air Quality and Emissions Trends Report, 1999

Revised January 14, 2002

Page ii:	Change date in "Data Source: U.S. EPA AIRS Data Base 1/30/01" to "7/12/00."
Page 21, Figure 2-13:	Add new legend to map.
Page 44, Figure 2-41:	Figure re-plotted using the major categories within the Miscellaneous category (instead of "Miscellaneous").
Page 52, Figure 2-51:	Replaced with new map.
Page 59, Figure 2-60:	Figure re-plotted using the major categories within Miscellaneous (instead of Miscellaneous).
Page 237	Notes added on "Data Sources for Figure 2-55."

About the Cover

The map on the cover depicts nationwide annual mean $PM_{2.5}$ concentrations from the Federal Reference Method (FRM) monitoring network, as well as information on data completeness. Annual mean concentrations are generally above the level of the 1997 standard of 15 $\mu g/m^3$ in much of the eastern United States and throughout California. Annual mean concentrations above 20 $\mu g/m^3$ are seen in several major metropolitan areas including Pittsburgh, Cleveland, Atlanta, Chicago, and St. Louis and Los Angeles The western Great Plains and mountain regions show notably low annual mean concentrations, most below 10 $\mu g/m^3$.

Data Source: U.S. EPA AIRS Data Base 7/12/00.

Disclaimer

This report has been reviewed and approved for publication by the U.S. Environmental Protection Agency's Office of Air Quality Planning and Standards. Mention of trade names or commercial products are not intended to constitute endorsement or recommendation for use.

Acknowledgments

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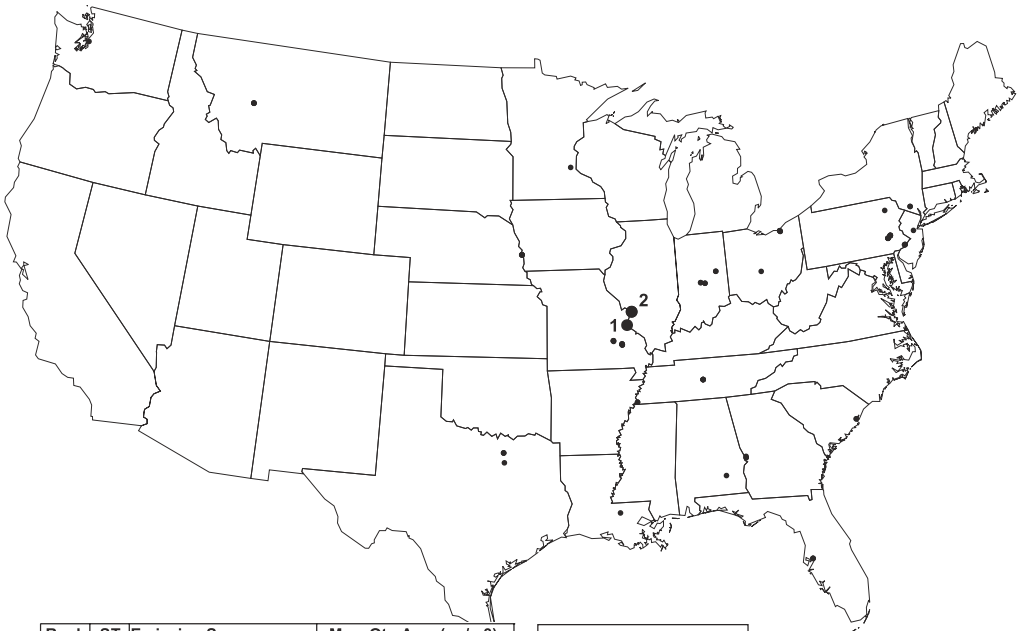
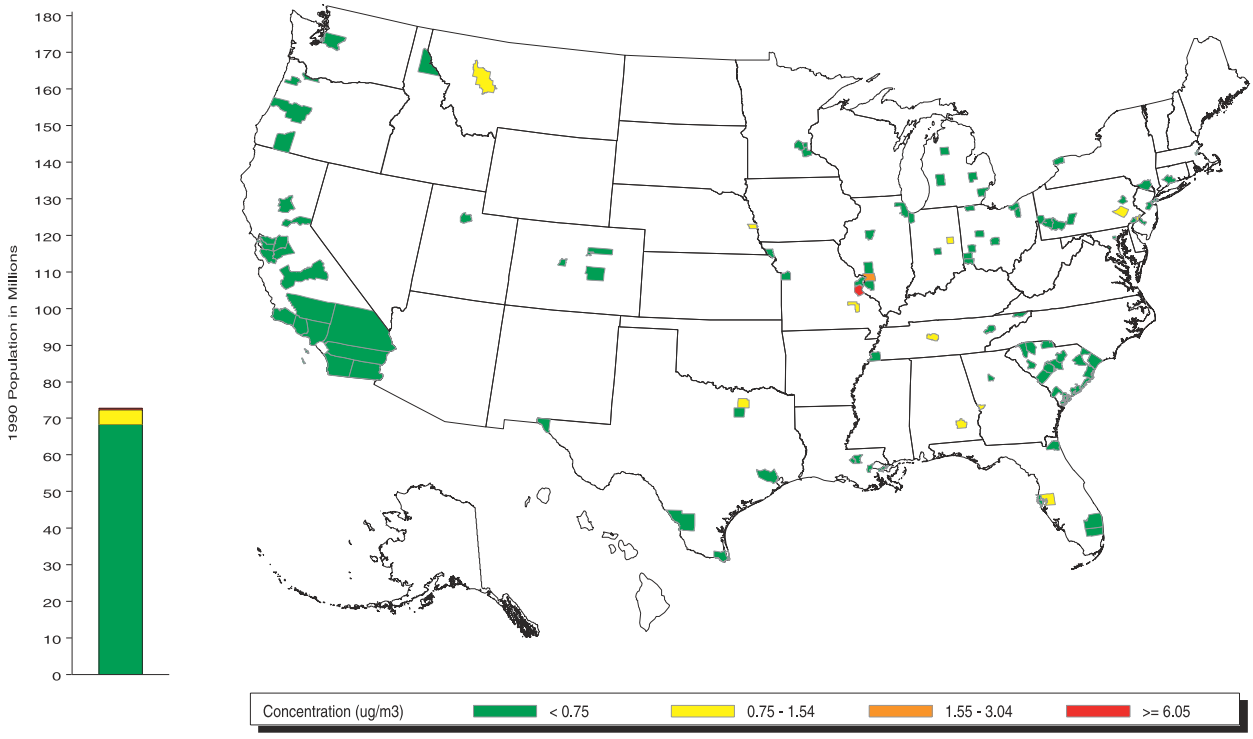
Figure 2-13. Pb maximum quarterly concentration in the vicinity of Pb point sources, 1999.



Rank	ST	Emission Source	Max. Qtr. Avg. (ug/m3)
1	MO	Doe Run (Herculeneum)	6.75
2	IL	Chemetco	2.5

Figure 2-14. Highest Pb maximum quarterly mean by county, 1990.



ried sources, shown in Figures 2-39 and 2-40. These include fuel combustion, industrial processes, and transportation. Of these, the fuel combustion category saw the largest decrease over the 10-year period (14 percent), with most of the decline attributable to a decrease in emissions from electric utility coal and oil combustion. Emissions from the industrial processes category decreased 3 percent, and emissions from the transportation category decreased 10 percent. The recent upward movement between 1998 and 1999 for industrial processing is attributed to new sources of emissions for open burning (of residential yard wastes and land clearing debris) that had not been characterized previously.

The second group of direct PM_{10} emissions is a combination of miscellaneous and natural sources including agriculture and forestry, wildfires and managed burning, and fugitive dust from paved and unpaved roads. It should be noted that fugitive dust emissions from geogenic wind erosion have been removed from the emissions inventory for all years, since the annual emission estimates based on past methods for this category are not believed to be representative. As Figure 2-41 shows, these miscellaneous and natural sources actually account for a large percentage of the total direct PM_{10} emissions nationwide, although they can be difficult to quantify compared to the traditionally inventoried sources. The trend of emissions in the miscellaneous/natural group may be more uncertain from one year to the next or over several years because these emissions tend to fluctuate a great deal from year to year. It should be noted that a change in methodology occurred between 1995 and 1996 in calculating PM_{10} emissions from unpaved roads. This has led to lower PM_{10} emissions from 1996 through 1999 than would have been predicted using the older methodology.

Figure 2-41. Total PM_{10} emissions by source category, 1999.

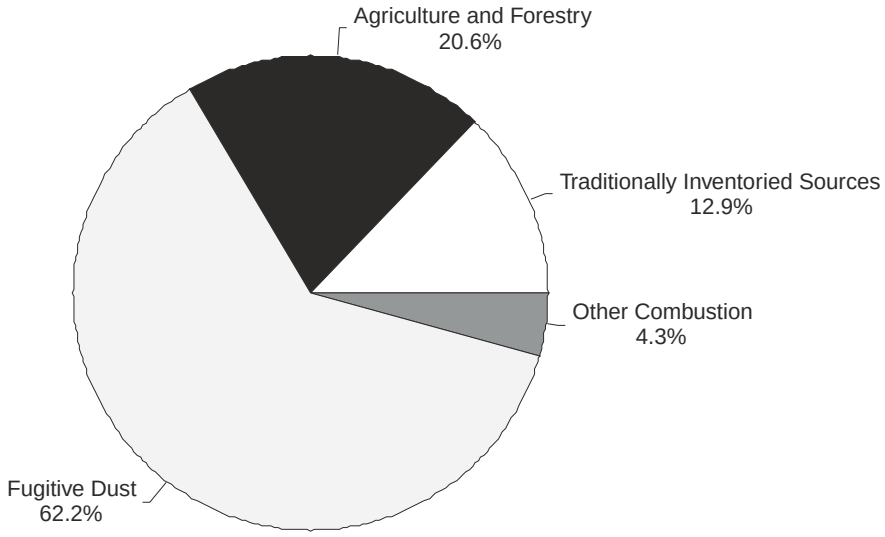


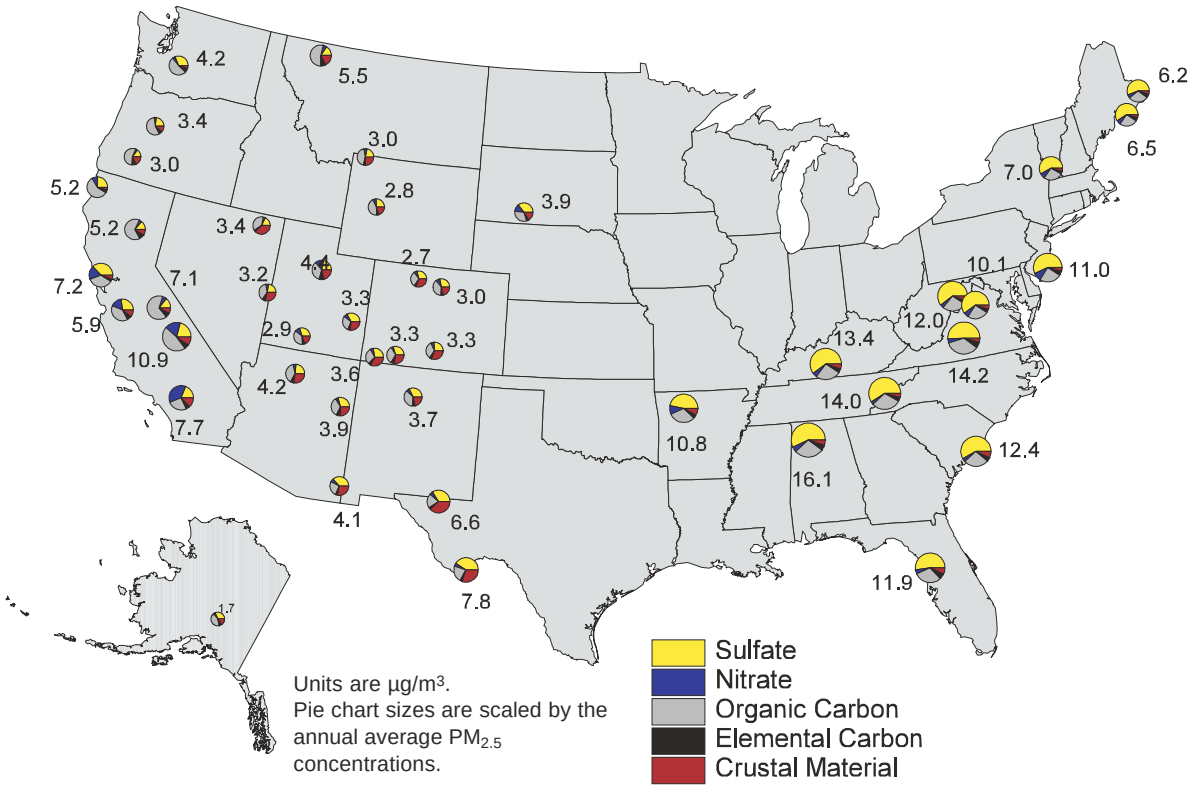
Table A-6 lists PM_{10} emissions estimates for the traditionally inventoried sources for 1990–1999. Miscellaneous and natural source PM_{10} emissions estimates are provided in Table A-7.

Figure 2-42 shows the emission density for PM_{10} in each U.S. county. PM_{10} emission density is the highest in the eastern half of the United States, in large metropolitan areas, areas with a high concentration of agriculture such as the San Joaquin Valley in California and along the Pacific coast. This closely follows patterns in population density. One exception is that open biomass burning is an important source category that is more prevalent in forested areas and in some agricultural areas. Fugitive dust is an important component in arid and agricultural areas.

PM_{10} Regional Air Quality Trends

Figure 2-43 is a map of regional trends for the PM_{10} annual mean from 1990–1999. All 10 EPA regions show decreasing trends over the 10-year period, with declines ranging from 5–33 percent. The largest decreases are generally seen in the western part of the United States. This is significant since PM_{10} concentrations are typically higher in the West. In the western states, programs such as those with residential wood stoves and agricultural practices have helped reduce emissions of PM_{10}. In the eastern United States, the Clean Air Act's Acid Rain Program has contributed to the decrease in PM_{10} emissions. The program has reduced

Figure 2-51. Annual mean $PM_{2.5}$ concentrations in 1999.

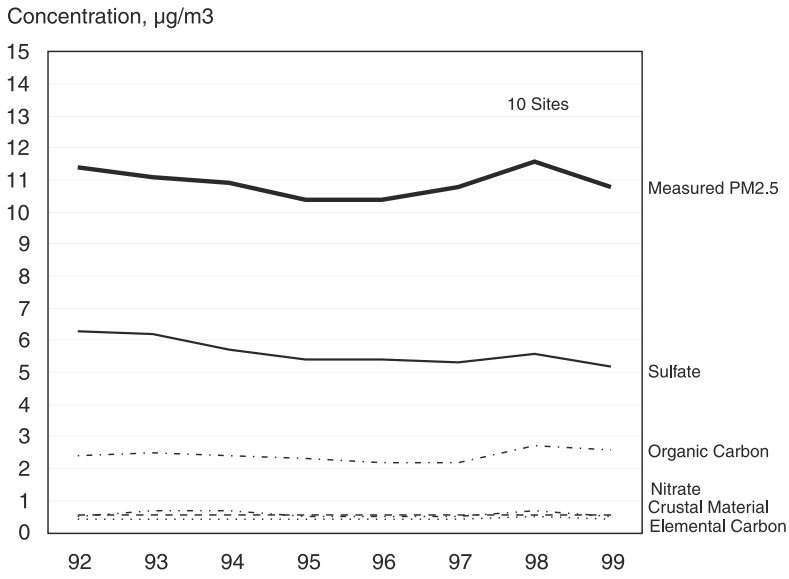


cent). Table 2-5 shows the difference in percent contribution of each species for the eastern versus western regions of the United States.

Table 2-5. Percent Contribution to $PM_{2.5}$ by Component, 1999

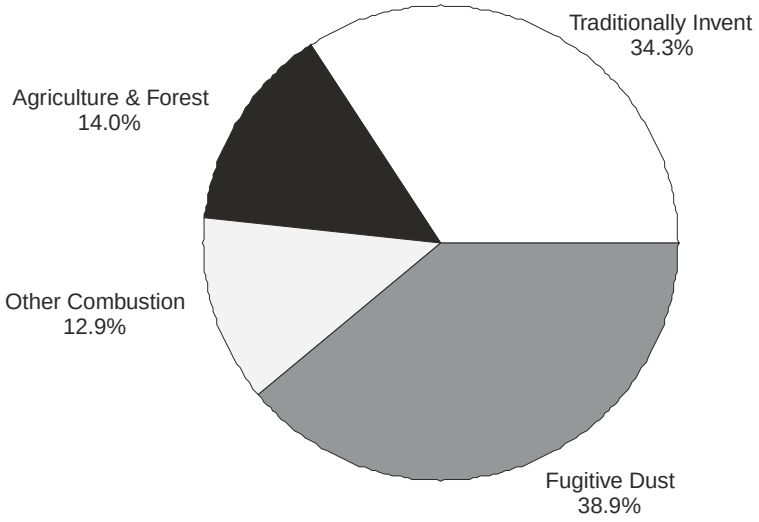
	East (10 sites)	West (26 sites)
Sulfate	56	33
Elemental Carbon	5	6
Organic Carbon	27	36
Nitrate	5	8
Crustal Material	7	17

Figure 2-52. $PM_{2.5}$ concentrations, 1992–1999 at eastern IMPROVE sites meeting trends criteria.



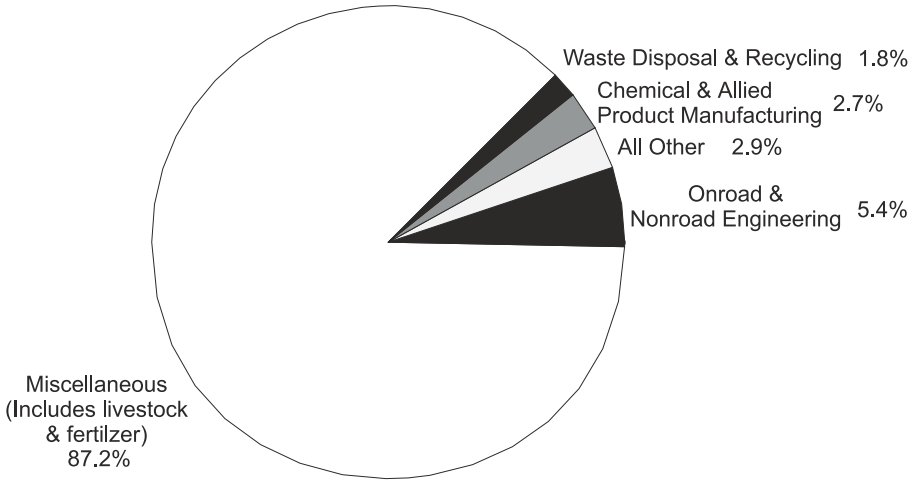
Note: Measured PM2.5 represents the direct mass measurement from the filter. The sum of the component concentrations do not equal this value because they do not account for all measured mass.

Figure 2-60. Total direct $PM_{2.5}$ emissions by source category, 1999.



$PM_{10-2.5}$ concentrations. Though the Southeast data is relatively incomplete, preliminary estimates suggest relatively low $PM_{10-2.5}$ levels throughout that region.

Figure 2-61. National ammonia emissions by principal source categories, 1999.



the 1997 annual average. Otherwise, any missing annual averages were filled in using simple linear interpolation from the two surrounding annual averages.

Notes on Data Sources for Figure 2-55

Composition and concentration data for all non urban locations were obtained from the Interagency Monitoring of Protected Visual Environments (IMPROVE). Washington, D.C. and Seattle data were also obtained from IMPROVE [Reference: IMPROVE, Cooperative Center for Research in the Atmosphere, Colorado State University, Ft. Collins, CO, May 2000]. and the Rochester data are based on a study conducted for NESCAUM. [Reference: Salmon, Lynn and Glen R. Cass, October, 1997, Progress Report to NESCAUM: Determination of Fine Particle Contraction and Chemical Composition in the Northeastern United States, 1995, California Institute of Technology, Pasadena, CA 91125.] The South Coast information is adapted from data collected in the South Coast area since 1982. [Reference: Christoforou, C.S., Lynn G. Salmon, Michael P. Hannigan, Paul A. Soloman and Glen R. Cass, Trends in Fine Particle Concentration and Chemical Composition. Journal of Air and Waste Management Association, Pittsburgh, PA. January 2000.] The Phoenix data is from a report by ENSR, "Plots and Tables to Characterize Particulate Matter in Phoenix, Arizona," prepared for the Arizona Department of Environmental Quality, ENSR Document 0493-018-8, November 1999. The San Joaquin data are from Desert Research Institute [Reference: PM_{10} and $PM_{2.5}$ Variations in Time and Space, Desert Research Institute, Reno, NV, October 1995.]. Knoxville data was provided by the Tennessee Valley Authority. [Reference: (a) Tanner, R. (Tennessee Valley Authority) Personal Communication with T.G. Pace, January, 1998.] The El Paso and Dallas data were reported as a part of the Texas $PM_{2.5}$ Sampling and Analysis Study, Desert Research Institute, December, 1998. The Denver data was collected under the Northern Front Range Air Quality Study (NFRAQS). [Reference: NFRAQS Final Report, Desert Research Institute, Reno NV, June 1998. Note that this compositional data is the average of winter and summer sampling seasons; thus, no annual average is reported. The New Haven data was provided to Scott Mathias in a personal communication from John Graham, Connecticut Department of Environmental Protection, Bureau of Air Management August 16, 2000.

Non urban data are based on averages of several monitoring locations in the region. Urban data are mainly based on only one location in each area and may not represent the entire urban area. The exceptions to this are the South Coast and San Joaquin Valley areas of California where multiple locations are averaged together. In the South Coast basin, Rubidoux recorded the highest average $PM_{2.5}$ and nitrate concentrations. Additional information on the composition of $PM_{2.5}$ within these areas of California is discussed further in Christoforou (above) and DRI [Reference: PM_{10} and $PM_{2.5}$ Variations in Time and Space, Desert Research Institute, Reno, NV, October 1995.]

References

1. Clean Air Act Amendments of 1990, U.S. Code, volume 42, section 7403 (c)(2), 1990.

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3. Aerometric Information Retrieval System (AIRS), Volume 2, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October, 1993.

4. Falke, S. and Husar, R. (1998) Correction of Particulate Matter Concentrations to Reference Temperature and Pressure Conditions, Paper Number 98-A920, Air & Waste Management Association Annual Meeting, San Diego, CA, June 1998.

5. Ambient Air Quality Surveillance, 51 FR 9597, March 19, 1986.

6. U.S. Environmental Protection Agency Intra-Agency Task Force Report on Air Quality Indicators, EPA-450/4-81-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 1981.

7. Rosenbaum, A. S., Stiefer, M. P., and Iwamiya, R. K. November, 1999. *Air Toxics Data Archive and AIRS Combined Dataset: Contents Summary Report*. SYSAPP-99/26d. Systems Applications International, San Rafael, CA.

8. In all cases analyzed, four non-missing quarterly means were available after applying the GLM method, so that the resulting annual mean is the arithmetic mean of the four quarterly averages.

9. Cohen, J.P. and A. K. Pollack. 1990. *General Linear Models Approach to Estimating National Air Quality Trends Assuming Different Regional Trends.* SYSAPP-90/102. Systems Applications International, San Rafael, CA.