

GATEWAY CITIES

COUNCIL OF GOVERNMENTS

November 16, 2006

Mr. Joseph Cassmassi, Planning and Rules Manager
SCAQMD
21865 Copley Drive
Diamond Bar, CA 91765

Dear Mr. Cassmassi:

Comments on the Draft 2007 AQMP and Notice of Preparation

The Gateway Cities Council of Governments (COG) is pleased to submit comments on the Draft 2007 AQMP and the Notice of Preparation. The Gateway Cities COG consists of 27 cities located in Southeast Los Angeles County, with a combined population of 2.1 million residents. The COG area is greatly impacted by air pollution from the Ports of Los Angeles and Long Beach, which collectively represent the largest sources of emissions in the entire South Coast Air Quality Basin. The AQMP will set the stage over the next three years for the development of programs and rules for the South Coast Air Quality Management District (the District), which will impact our communities.

The 2007 AQMP Should Focus on the Largest Sources of Emissions

Recently, the District has exhibited assertive and forward thinking leadership in addressing the Basin's least regulated industry, international trade and goods movement. The GCCOG applauds the District for its efforts and for its willingness to take on this technically, legally and politically complex issue. Our member cities are enthusiastic about the San Pedro Bay Ports Clean Air Action Plan and congratulate the District for its role in assisting the Ports in the development of the Plan. The Draft AQMP acknowledges that the air emissions from the Ports represent the largest source of emissions in the entire Basin. According to the Draft, the Ports will account for "73% of SOx, 24% of Nox and 10% of PM 2.5 in 2020." We believe that insofar as the Draft AQMP emphasizes actions by the District and others to address the emissions resulting from the trade and logistics industry, it has successfully focused on the most important target in our region. We urge all parties to continue creatively exploring ways in which to influence emissions even where direct regulatory authority is not explicit.

The GCCOG also appreciates the productive working relationship with the District on identifying and funding GCCOG programs to deal with the air pollution from the goods movement industry. The direct impact of diesel emissions on the health of our residents led the GCCOG to develop its Clean Air Program. We are proud of our accomplishments in replacing over 500 pre-1994 heavy duty diesel trucks and keeping those replacement trucks in service in the South Coast Air Basin. We look forward to scaling up the Program in partnership with the Ports of Long Beach and Los Angeles and the District in the future. We believe the Basin will benefit both from the emissions reductions generated by the new trucks and from the expertise developed, lessons learned and example set by our pioneering work.

Emission Growth Management (EMG) Control Measures

The Draft AQMP indicates that it relies on an iterative process of technology/strategy review and ambient air quality monitoring to develop an overall strategy for meeting state and federal requirements. The process should focus first on control measures that are likely to result in the greatest improvements in air quality. We believe the measures outlined in the *San Pedro Bay Clean Air Action Plan* and other documents in fact accomplish this objective and are consistent with the process described above.

However, District staff is also proposing new emission growth management measures (EGM-01) that are not as well vetted and whose benefits are neither as significant nor as well defined. As the District has worked closely with the Ports in the development of the Ports Clean Air Action Plan, so the District needs to work closely with the GCCOG and other municipal representatives to understand the potential benefits and potential unintended consequences of growth mitigation measures. This process should begin immediately after the adoption of the 2007 AQMP. For now, the District should consider placing these measures in the category of Long Range Measures, not yet well enough understood for implementation. These measures are:

- Air Quality Development Impact Fee This program consists of a "voluntary mitigation fee" to be charged to new development and redevelopment projects. The AQMP points to the existing development impact fee program adopted in the San Joaquin Valley in 2005. Discussion with municipal representatives about such a fee would consider the differential impacts on older, built out communities. Many such communities have a difficult time attracting new development and redevelopment, due to prior "brownfield" contamination issues, high land costs and aging public infrastructure. These discussions would also consider communities' legal obligations to meet State mandated Regional Housing Needs Allocation (RHNA) affordable housing requirements. An air quality mitigation fee could have the unintended consequence of exacerbating the economic and social distress facing many of our communities.

- *New Development and Project Threshold Approach* This measure proposes a program that would establish emission thresholds for new development and redevelopment projects. Projects exceeding certain thresholds would be required to implement a series of mitigation measures. The draft AQMP indicates that fee options could be used "in lieu" of the mitigation measures and that the collected fees would finance emission reduction programs within the impact community "to the extent feasible". Similar to our concerns expressed regarding the impact fees, this proposal should also be placed into the Long Range measure category, to be subjected to further review and refinement in consultation with municipalities.
- *Enhanced CEQA Review* This measure proposes enhancing the CEQA review and additional mitigation measures. The AQMP proposes that local agencies apply updated guidance and mitigation recommendations into projects. This CEQA review process is currently underway in our communities, including each City making a determination as to whether or not all reasonable and feasible mitigation measures have been applied to the development or redevelopment project. We do not understand the need for additional mitigation fees above imposing the appropriate mitigation measures (CEQA Mitigation Fee Program). Before being incorporated into an AQMP this program requires some additional description on the amount and uses of the fee.

Urban Heat Islands This measure proposes to impact air pollution by reducing the heat generated from urban development, including roofs and roads. It calls for the use of light colored roofing materials, and the use of light color asphalt or concrete for street reconstructions. Consultations with cities would provide for discussion of municipal design review standards, including regulations on roofing materials and colors, design districts, historical materials such as Spanish tile, potential economic justice issues resulting from increased street paving costs and review of the scientific basis of anticipated benefits.

Water Quality Impacts

Finally, we would like to direct the District's attention to the issue of air-water interface. The Draft AQMP appears to continue the institutional bifurcation of these issues. On the ground, however, there is an important air-water interface. The impact of atmospheric deposition on surface water quality is a major challenge we are only beginning to understand. We believe there is a substantial body of evidence as well as clear regulatory obligation to make a compelling argument that the time has come to recognize and address this matter in the Plan. The Basin has taken tremendous strides toward improving air quality since the late 1940's; however the relationship between air quality and water quality has yet to be fully addressed.

The importance of the air-water interface was made clear to the GCCOG cities through the establishment of Los Angeles and San Gabriel River Metals Total Maximum Daily Loads (TMDLs). Research by the Southern California Coastal Water Research Project

Mr. Joseph Cassmassi, Planning and Rules Manager

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(SCCWRP) and UCLA demonstrated that indirect dry-weather atmospheric deposition could be several thousand kilograms per year. Loads of copper, lead and zinc deposited on the land were several times the estimated loads of these metals in the rivers. The metal loads deposited from the air onto the ground then make their way via stormwater to the Rivers and cities throughout the respective watersheds are held accountable.

The GCCOG recognizes that the District must adopt a revised AQMP by June of 2007. However, the air-water interface issue is too important to be ignored. We would like to offer to work with the District by supplying information and assistance from individuals and organizations who have been investigating this issue. We are hopeful that this assistance will permit the District to address this critical issue by the June deadline. At a minimum, we request that this matter become part of the ongoing work of the District.

In addition to the cities' regulatory obligations, we believe the District itself has a statutory obligation based on 42 USC Section 7062(h) (CCA Section 302(h) which states in relevant part:

"All language referring to effects on welfare includes, but is not limited to, effects on soils, **water**, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants."
(Emphasis added).

We further note that while the District's continued emphasis on particles less than or equal to 10 microns is appropriate in its rightful focus on human health impacts, recent research demonstrates that much of the trace metals found in storm water consists of relatively coarse particles (greater than 10 microns).

As the Districts efforts have evolved with the evolution of our knowledge of the impacts of air pollution constituents on human health, so too must its efforts evolve with the evolution of our knowledge of the impacts of air pollution constituents on water quality. We look forward to working with you in this regard.

In conclusion, please note that these comments are to be considered input from technical and administrative staff of member agencies of the Gateway Cities Council of Governments and not a formal position of the Gateway Cities COG Board of Directors.

Sincerely,



Richard R. Powers
Executive Director

Comments on the Draft 2007 AQMP

By
Kenneth C. Farfsing
City Manager, City of Signal Hill
For the Gateway Cities Council of Governments

November 16, 2006

Good Afternoon. My name is Ken Farfsing, I am the City Manager of the City of Signal Hill. I am representing the Gateway Cities Council of Governments, a group of 27 cities located in Southeast Los Angeles County. I will be providing both oral and written comments on the draft 2007- AQMP.

First, we want to thank the District for your forward thinking leadership in addressing the Basin's least regulated industry – international trade and goods movement. The District should be commended for moving forward on this technically, legally and politically complex issue. The Gateway Cities bear the brunt of the air pollution impacts from the Ports. We stand ready to work with the District on programs to improve the air quality from the ports – including implementation of the San Pedro Bay Ports Clean Air Action Plan.

The COG also appreciates the productive working relationship with the District on identifying and funding COG programs to deal with the air pollution from goods movement. We are proud of our accomplishments in replacing over 500 pre-1994 heavy-duty diesel trucks in the region. We look forward to scaling up this program. We believe that because of the short-time frame of the AQMP, that we need to focus on the largest source of regional emissions – which are the ports and good movement.

Emission Growth Management Concerns

We also have comments on the new Emission Growth Management Control Measures proposed in the draft AQMP. We believe that some of these proposals are not well vetted and the benefits are neither significant nor well defined. It makes sense to establish a process to study the EGM proposals as “Long Range Measures.” We stand ready to work with the District to better define these new proposals, after the adoption of the AQMP.

There are 4 programs that we feel need to be considered as Long Range Measures, for further refinement and discussions with local government –

- 1) Air Quality Development Impact Fee – Development impact fees need to be carefully considered, especially in the Gateway Cities region – which suffers from high poverty rates and economic underdevelopment, due in part to Brownfield contamination issues making new development and redevelopment economically difficult for our communities.

- 2) New Development and Project Threshold Approach - The AQMP indicates that fee options could be used "in lieu" of the development impact fees. We are unclear to the amount of the fees and whether air quality projects would be funded in the community where the fees are collected.
- 3) Enhanced CEQA Review – Cities would welcome assistance with enhanced mitigation measure, however we do not understand the need for additional mitigation fees above the measures imposed on development projects.
- 4) Urban Heat Islands – We believe that the District needs to consult with the cities on this proposed program – especially in the areas of municipal design review standards, design districts, the use of historical roofing materials – like Spanish tile and as increases in paving costs and the scientific basis of the anticipated benefits.

Air Quality Impacts Water Quality in the Region

The AQMP appears to continue to bifurcate a major issue facing our region – the pollution from the air ends up polluting the surface waters in the region. The CARB and the State Water Board recently held a historic meeting on this major and growing problem. They are beginning to address the issue of the overlap between air and water quality.

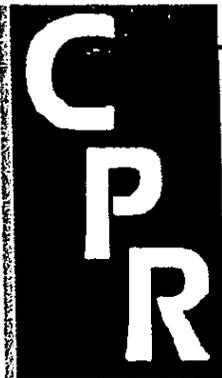
Several recent scientific studies (by the Southern California Coastal Water Research project and UCLA) estimated that 57% to 100% of the metals found in urban runoff come from the atmosphere. These metals wash into the region's water bodies – causing pollution. However, the region needs better data in order to characterize the problem and to develop solutions. The AQMP can expand existing monitoring programs to help with the data collection.

We believe that the District has an regulatory obligation (under 42 USC Section 7062(h) and CCA Section 302(h) to measure the effects on water from air pollution. The AQMP should have a chapter devoted to this major emerging issue. While it is important to continue to emphasize measuring air pollution particles that impact human health, the AQMP should address measuring air pollution particles greater than PM 10, which adversely impact surface water quality.

Thank you for your time today. I will be submitting a November 16, 2006 letter for the AQMP record.

COALITION FOR PRACTICAL REGULATION

"It's about saving jobs"



April 17, 2006

Via Fax

Docket ID No. EPA-HQ-OAR-2001-0017
Environmental Protection Agency
Mailcode: 6102T
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460
Fax: (202) 566-1749

Subject: Comments on Docket ID No. EPA-HQ-OAR-2001-0017

Dear Administrator Johnson and EPA Staff:

On behalf of the Coalition for Practical Regulation (CPR), an *ad hoc* group of 43 cities within Los Angeles County that have come together to address water quality issues, I would like to submit the following comments on Docket ID no. EPA-HQ-OAR-2001-0017, EPA's proposed revisions to the primary and secondary national ambient air quality standards (NAAQS) for particulate matter (PM).

Our member cities are very interested in the relationship between atmospheric deposition and water quality. The importance of the air-water interface was made clear to us through the Los Angeles River Metals TMDLs. After reviewing research by scientists at the Southern California Coastal Water Research Project (SCCWRP) and UCLA that demonstrated that indirect dry-weather atmospheric deposition to the Los Angeles River Watershed could be several thousand kilograms per year, and that estimates of copper, lead, and zinc deposited on the land were several times the estimated loads of these metals in the river, we became very concerned about the impacts of atmospheric deposition on water quality.

CPR recognizes that EPA must adopt final revised regulations by September 27, 2006. However, we are concerned that this deadline will prompt the agency to once again neglect to properly consider the impacts of atmospheric deposition on water quality. Public welfare-related secondary PM standards should be revised to address impacts on water quality as required by Clean Air Act (CAA) Section 302(h).

ARCADIA
ARTESIA
BALDWIN PARK
BELL
BELL GARDENS
BELLFLOWER
BRADBLERY
CERRITOS
COMMERCE
COVINA
DIAMOND BAR
DOWNEY
GARDENA
HAWAIIAN GARDENS
INDUSTRY
IRWINDALE
LA CAÑADA FLINTRIDGE
LA MIRADA
LAKEWOOD
LAWDALE
MONROVIA
MONTEBELLO
MONTEREY PARK
NORWALK
PALOS VERDES ESTATES
PARAMOUNT
PICO RIVERA
POMONA
RANCHO PALOS VERDES
ROSEMEAD
SANTA FE SPRINGS
SAN GABRIEL
SIERRA MADRE
SIGNAL HILL
SOUTH EL MONTE
SOUTH GATE
SOUTH PASADENA
VERNON
WALNUT
WEST COVINA
WHITTIER

The EPA Strategic Plan states that, "The mission of the United States Environmental Protection Agency is to protect human health and to safeguard the natural environment – air, water, and land – upon which life depends." The Strategic Plan also says that one of the Agency's guiding principles is to emphasize pollution prevention. The Plan explains that the Agency will do this by structuring "approaches to create incentives for preventing pollution and the transfer of pollution among air, water, and land." The Strategic Plan also acknowledges that, "There are many human health and environmental challenges that cannot be met with traditional media-specific 'command and control' approaches."

To prevent the transfer of pollution between air and water, the Agency should reinvigorate its air-water interface work plan and deal with air-water interface issues when it reissues secondary PM standards this fall. The air-water interface issue is one of the most important environmental issues of our time – even more immediately important than the more publicized and popular global warming issue. About 75% of the planet's surface is water and atmospheric deposition of toxic metals and other pollutants is polluting that water. USEPA did recognize the importance of the air-water interface in the 1990s when its Office of Air and Radiation and its Office of Water started a cooperative program to assess and reduce atmospheric deposition of toxics and nitrogen to all water bodies in the United States. EPA prepared a January 2001 "Air-Water Interface Work Plan" and published a September 2001 Frequently Asked Questions About Atmospheric Deposition: A Handbook for Watershed Managers. These are both very informative documents; however, the program seems to have floundered and the findings of that program are not reflected in the proposed revisions to the secondary natural ambient air quality standards for particulate matter (PM).

In the January 17, 2006 Proposed Rule on National Ambient Air Quality Standards for Particulate Matter, EPA ignores the air-water interface. Rather than revising the secondary standards to incorporate measures to address the impacts of atmospheric deposition on water quality, EPA proposes that the current standards be amended to match the proposed amendments to the primary standards that are designed to respond to direct human health impacts of atmospheric deposition. The proposed rule does briefly address certain PM-related public welfare effects, such as visibility impairment, soiling, and effects on vegetation and ecosystems, but it all but ignores water.

As noted in the January 17, 2006 Federal Register, two sections of the Clean Air Act (CAA) govern the establishment and revision of the national ambient air quality standards. The first is Section 108 (42 USC 7408), which directs the USEPA Administrator to identify and list air pollutants that may reasonably be anticipated to endanger public health and welfare and to issue quality criteria for those that are listed. The second governing section is Section 109 (42 USC, 7409), which requires the USEPA Administrator to propose and promulgate primary and secondary NAAQS standards for pollutants listed pursuant to Section 108 (Federal Register, Jan. 17, 2006, p. 2622).

There is widespread evidence that several of the pollutants listed pursuant to the Clean Air Act exist, at least in part, as particulate matter, and are known or should be anticipated to cause adverse impacts to water quality.

42 USC Section 7602(h) [CAA Section 302(h)] includes language that specifies, "All language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants." Further, 42 USC Section 7409(b)(2) [CAA Section 109(b)(2)] requires that "any national secondary ambient air quality prescribed under subsection (a) of this section shall specify a level of air quality the attainment of which in the judgment of the Administrator, based on such criteria, is requisite to protect the public welfare from any known or anticipated adverse impacts associated with the presence of such air pollutant in the ambient air."

CPR contends that EPA's continuing focus only on particles less than or equal to 10 microns is inappropriate and contrary to Clean Water Act Sections 108 and 109(b)(2). From the time EPA first established national ambient air quality standards for particulate matter in 1971 until the significant revisions promulgated in 1987, the reference method for determining compliance was the high volume sampler that collected particulate matter up to a nominal size of 25 to 45 microns. This measurement was referred to as total suspended particles, or TSP. The 1987 revision to a 10-micron standard was appropriate for a primary (health-related) standard but not for a secondary (welfare-related) standard, especially since 1987 was also the year that the Clean Water Act was changed to define municipal and other stormwater discharges as point source discharges subject to NPDES permits.

In Section III.B of the proposed rule, EPA notes, "the Administrator provisionally concludes that the available evidence does not provide a sufficient basis for establishing distinct secondary standards for PM based on any of these effects alone." This provisional conclusion may be appropriate for the PM-related welfare effects specified in the proposed rule. However, it would not be correct if water quality impairments had been specifically considered as required by the Clean Air Act.

EPA's rationale for the proposed decisions on secondary PM standards erroneously focuses only on visibility impairment, materials damage, and soiling while ignoring the adverse impacts on water quality by air pollutants acknowledged by EPA in its 2001 Air-Water Interface Work Plan and its work on Deposition of Air Pollutants to the Great Waters. EPA can no longer avoid considering the impacts of water quality on public welfare when it amends national ambient air quality standards for particulate matter and other pollutants listed under Section 108 of the Clean Air Act. Since the agency has gathered significant information on the air-water interface, the Administrator must consider this information when proposing revisions to secondary national ambient air quality standards. Further, the rationale for the proposed revisions to secondary standards

must contain an explanation of the impacts of water quality impairment on public welfare just as it does for visibility impairment and other specified PM-related welfare effects.

CPR recognizes that, as discussed in the January 17, 2006 Federal Register, "particulate matter" is a general term for a broad class of diverse substances that occur as discrete particles. We also appreciate that assessment of health and welfare effects is complicated by the variety of anthropogenic and natural sources and the great variability of chemical and physical properties of particulate matter. Our member cities face similar problems as they address stormwater quality problems in our region.

CPR questions EPA's proposal to continue defining the suite of secondary PM standards to be identical to the suite of primary PM standards. We also question EPA's proposal to continue to specify that the secondary standards are intended to address visibility impairment associated with fine particles and other PM-related welfare effects including only vegetation and ecosystems, materials damage and soiling, and climate change. CPR does not understand how EPA can continue to legally avoid adopting secondary PM standards related to the adverse impacts of atmospheric deposition on water quality.

The June 2005 Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment, Scientific and Technical Information notes that particle properties and associated health and welfare effects differ by particle size, and that the diameters of atmospheric particles range in size from .001 microns to 100 microns. It also notes that a Wide Range Aerosol Classification (WRAC) collects the entire coarse mode from 1 to 100 microns. Gathering data from a broad range of coarse particles would be very helpful in dealing with the contribution of atmospheric pollutants to pollution of the nation's waters.

The Public Review Draft of the National Water Program Fiscal Year 2007 Guidance published by the Office of Water on March 1, 2006 indicates that EPA expects to make significant progress toward protecting human health and improving water quality by 2008. The agency proposes to reduce pollution in waters with fish advisories to that consumption limits can be relaxed for 3% of problem waters. It also proposes to restore an increasing percentage of the approximately 20,000 impaired waters across the nation, with the goal of restoring 25 percent of those waters by 2012.

The proposed revision to secondary particulate matter standards is inconsistent with the Office of Water's stated objectives and ignores recent research by the Southern California Coastal Water Research Project (SCCWRP) and the University of California at Los Angeles (UCLA) that identified dry atmospheric deposition as a significant source of trace metals (chromium, copper, nickel, lead, and zinc) in semi-arid Los Angeles. Their research demonstrated that atmospheric deposition potentially accounted for 57-100% of the trace metal loads in annual stormwater discharges in a highly impervious catchment. Most of the deposited material was relatively coarse (greater than 10 microns). The study was based on dry deposition measurements made monthly for a one-year period starting in the spring of 2003, and the study was partially funded by the USEPA Great Waters

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Program. More information is needed concerning large-scale atmospheric deposition throughout Southern California and other areas of the County.

CPR requests that EPA make the following changes to the proposed secondary PM standards to acknowledge the impacts of atmospheric deposition on water quality:

- Include a subsection in the secondary standards section of the proposed rule discussing the impacts of particulate deposition on water quality;
- Specify that PM_{10-2.5} particles constitute an inhalable coarse particle subset of coarse particles;
- Specify that PM₆₀ particles are water quality impact coarse particles;
- Commit to a schedule for developing standards for PM₆₀ water quality impact coarse particles; and
- Develop a monitoring protocol and program for monitoring PM₆₀ coarse particles.

In addition, CPR requests that USEPA update the Air-Water Interface Work Plan prepared in January 2001 and that the agency implement the updated plan.

The Coalition for Practical Regulation appreciates the opportunity to provide these comments on the proposed revisions to the primary and secondary national ambient air quality standards for particulate matter [Docket ID No. EPA-HQ-OAR-2001-0017]. We strongly encourage EPA to consider our suggestions and the suggestions of other interested parties. USEPA is in the position to take the lead in responsibly addressing the air-water interface when developing or revising environmental policy in the United States. In proposing to revise the NAAQS for particulate matter, we look to the Agency to do so.

Sincerely,



Larry Forester
CPR Steering Committee
City Council Member, City of Signal Hill

cc: CPR Steering Committee
CPR Members

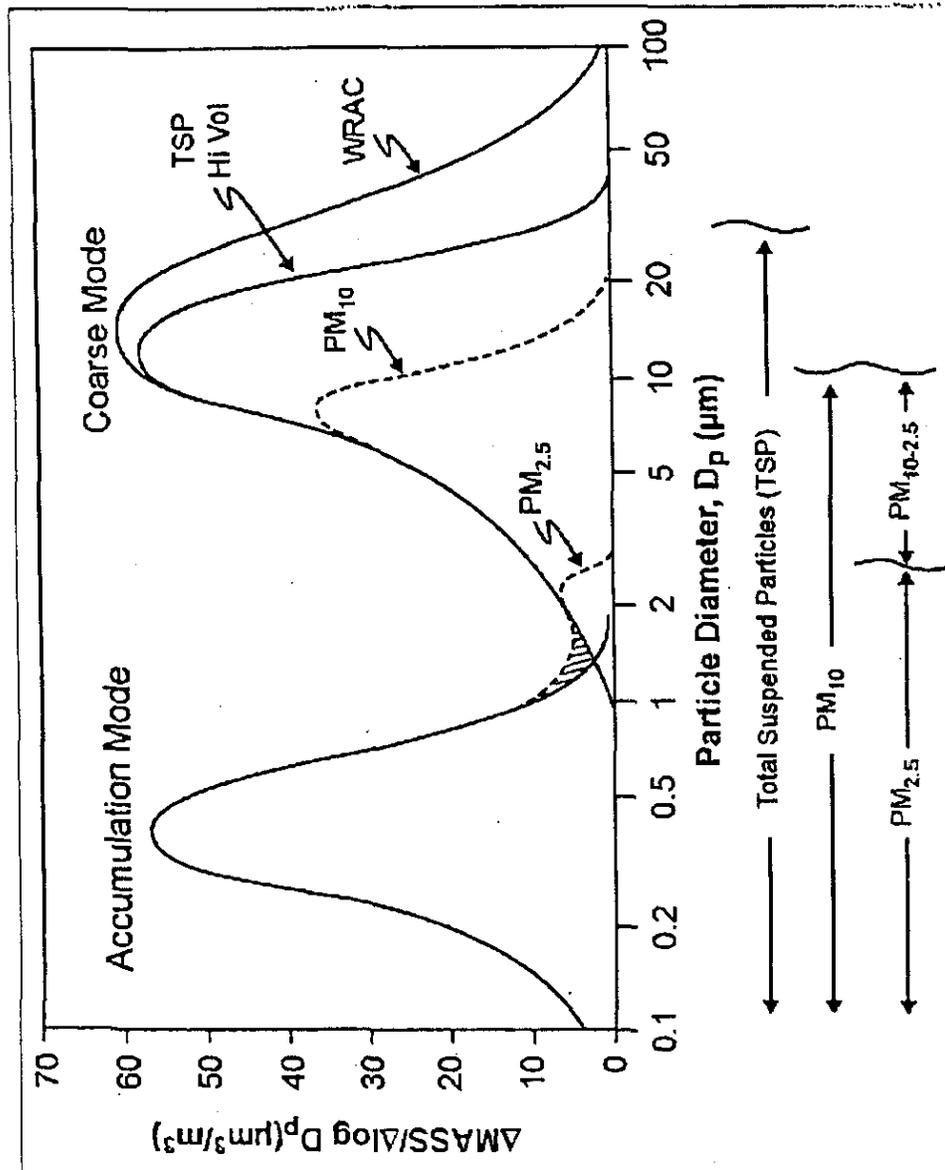


Figure 2-2. An idealized distribution of ambient PM showing fine and coarse particles and the fractions collected by size-selective samplers. (WRAC is the Wide Range Aerosol Classifier which collects the entire coarse mode).

Source: Adapted from Wilson and Suh (1997) and Whitby (1978), CD page 2-18

Table 2-1. Particle Size Fraction Terminology Used in Staff Paper

Term	Description
Size Distribution Modes	
Coarse Particles	The distribution of particles that are mostly larger than the intermodal minimum in volume or mass distributions; also referred to as coarse-mode particles. This intermodal minimum generally occurs between 1 and 3 μm .
Thoracic Coarse Particles	A subset of coarse particles that includes particles that can be inhaled and penetrate to the thoracic region (i.e., the tracheobronchial and the gas-exchange regions) of the lung. This subset includes the smaller coarse particles, ranging in size up to those with a nominal aerodynamic diameter less than or equal to 10 microns.
Fine Particles	The distribution of particles that are mostly smaller than the intermodal minimum in volume or mass distributions; this minimum generally occurs between 1 and 3 μm . This includes particles in the nucleation, Aitken, and accumulation modes.
Accumulation-Mode Particles	A subset of fine particles with diameters above about 0.1 μm . Ultrafine particles grow by coagulation or condensation and "accumulate" in this size range.
Ultrafine Particles	A subset of fine particles with diameters below about 0.1 μm , encompassing the Aitken and nucleation modes.
Aitken-Mode Particles	A subset of ultrafine particles with diameters between about 0.01 and 0.1 μm .
Nucleation-Mode Particles	Freshly formed particles with diameters below about 0.01 μm .
Sampling Measurements	
Total Suspended Particles (TSP)	Particles measured by a high volume sampler as described in 40 CFR Part 50, Appendix B. This sampler has a cut point of aerodynamic diameters that varies between 25 and 40 μm depending on wind speed and direction.
PM ₁₀	Particles measured by a sampler that contains a size fractionator (classifier) designed with an effective cut point (50% collection efficiency) of 10 μm aerodynamic diameter. This measurement includes the fine particles and a subset of coarse particles, and is an indicator for particles that can be inhaled and penetrate to the thoracic region of the lung; also referred to as thoracic particles.
PM _{2.5}	Particles measured by a sampler that contains a size fractionator (classifier) designed with an effective cut point (50% collection efficiency) of 2.5 μm aerodynamic diameter. This measurement, which generally includes all fine particles, is an indicator for fine particles; also referred to as fine-fraction particles. A small portion of coarse particles may be included depending on the sharpness of the sampler efficiency curve.
PM _{10-2.5}	Particles measured directly using a dichotomous sampler or by subtraction of particles measured by a PM _{2.5} sampler from those measured by a PM ₁₀ sampler. This measurement is an indicator for the coarse fraction of thoracic particles; also referred to as thoracic coarse particles or coarse-fraction particles.