NATIONAL HEADQUARTERS

61 Broadway
New York, NY 10006-2701
phone: (212) 315-8700
fax: (212) 315-8800

1150 18th Street, NW
Suite 900
Washington, DC 20036-3816
phone: (202) 785-3355
fax: (202) 452-1805

AMERICAN LUNG ASSOCIATION.

Comments of the American Lung Association on
EPA Staff Paper Recommendations for Establishment of a
Coarse Particle Standard

Presented by Deborah Shprentz, Consultant
August 11, 2005

The American Lung Association has consistently supported the establishment of effective new coarse particle air quality standards. The evidence is clear that coarse particles contribute to increased risk of hospitalization for heart and lung disease, increased respiratory symptoms and decreased lung function, and may also contribute to premature mortality.

Recent Studies Bolster the Case for Action to Control Coarse Particles

Just this month a study published online in *Pediatrics* reported a detrimental effect of relatively low levels of coarse particulate matter on hospitalizations for respiratory infections in children. This study used a case-crossover design to examine the relationship between various air pollutants and hospitalization for respiratory infections among children younger than 15 years in Toronto over a 4-year period. When PM and gaseous pollutants were both taken into account, the effect remained pronounced for $PM_{10-2.5}$ in both boys and girls.[1]

A multi-decade study In Press in *Environmental Health Perspectives* reports that women who live in areas with greater coarse particle concentrations have a higher risk of developing and dying from coronary heart disease. In this long-term follow-up of the ASHMOG cohort, coarse particles were associated with increased risk of fatal heart disease in women, especially older women, but not in men, though the effect was stronger for fine particles.[2]

In July, the results of laboratory toxicology study which exposed human alveolar macrophages and airway epithelial cells to particles in vitro and followed them for endpoints of inflammation and oxidant stress were reported in *Toxicology and Applied Pharmacology*. These are the two main airway cell types likely to interact with inhaled particles. The study found that the proinflammatory response in alveolar macrophages was driven by material present in the coarse PM. Cultures of bronchial epithelial cells also responded to the coarse fraction with higher levels

of certain markers of inflammation than induced by fine or ultrafine PM. These epithelial cells also showed evidence of oxidant stress in response to coarse particle exposure, as well as to other size fractions of PM. This study adds to our understanding of potential mechanisms.[3]

A systematic review of the epidemiological literature just published in the *European Respiratory Journal* reinforces many of the conclusions of the EPA staff scientists in the final Staff Paper. This review article examined studies that have investigated the effects of both fine and coarse particles, and found that for some health endpoints, the effects are even stronger for coarse particles than for fine. Specifically, the paper finds that "in studies of chronic obstructive pulmonary disease, asthma and respiratory admissions, coarse PM has a stronger or as strong short-term effect as fine PM, suggesting that coarse PM may lead to adverse responses in the lungs triggering processes leading to hospital admissions." The review also found support for an association between coarse PM and cardiovascular hospital admissions. With respect to the toxicology of coarse particles, the review concluded that "studies clearly show that coarse PM exerts toxic effects in laboratory experiments, and that such effects are at least as potent as those observed in experiments using fine PM, when expressed on a mass basis," while cautioning that fine particles may deliver a higher dose of toxic material to the lungs. Researchers concluded that the coarse particle fraction is of importance in the regulatory process as well as for control measures. [4]

In an accompanying editorial, Swedish, German, and Dutch researchers argued that systematic review offers evidence for the separate regulation of the coarse particle fraction.[5]

These recently published health studies show that EPA is on the right track with its proposal to regulate coarse thoracic particles, but the American Lung Association would like to offer some constructive criticism with respect to the scope and strength of the recommended standards.

Exempt Non-anthropogenic Sources, Not Rural Areas

In the final Staff Paper, acting upon the advice of CASAC, Staff Scientists recommend the establishment of an "Urban Coarse Particle" standard.[6,7] While at first blush this appeared to be a potential mechanism for focusing regulation on the most toxic fraction of ambient coarse particles, the staff recommendations in the final Staff Paper would exclude anthropogenic particles from industrial, traffic, and other sources in non-urban areas.

The National Ambient Air Quality Standards (NAAQS) are national in scope and are intended to protect all Americans. An "urban-only" standard would deny protection to the tens of millions of people who live outside major urban areas. It appears as though EPA intends to enforce the standard only in urban areas with populations greater than 100,000. Clearly there are industrial, traffic, and other anthropogenic sources of coarse

particle pollution throughout the country. Aluminum smelters, pulp mills, power plants, truck stops, and other facilities are often located in rural areas. Protection under the Clean Air Act is not a function of how many neighbors you have. Protection under the coarse particle NAAQS must extend to all areas of the country.

Further, EPA has an obligation under the Clean Air Act to prevent clean air areas of the country from deteriorating up to the level of the NAAQS. An "urban only" standard does not account for the need to prevent significant deterioration in air quality as required under the law.

Set Standards at Levels that Will Protect Public Health

A second concern relates to the proposed ranges for the coarse particle standard. The results of EPA's risk assessment for coarse particles shows that even at the lower end of the range proposed in the Staff Paper (50 $\mu g/m^3$ 98^{th} percentile, or 60 $\mu g/m^3$ 99^{th} percentile) there will be zero reduction in coarse particle risks of hospital admissions for asthma in Seattle, or in respiratory symptoms in children in St. Louis, the two cities analyzed, relative to "as is" concentrations.[8] A standard which does not demonstrate any reduction in public health risks from the status quo cannot possibly be considered health protective.

Furthermore, the health studies upon which EPA is basing its standard found adverse health effects at levels below the bottom end of the proposed range. Studies of respiratory and cardiovascular hospitalization in Detroit and Seattle, and with respiratory symptoms in children in six U.S. cities reported significant associations with coarse particle concentrations of 30 to 40 $\mu g/m^3$, 98^{th} percentile.[9]

Locate Monitors in Areas of Highest Expected Concentrations

A third concern regards the suggestion in the Staff Paper that monitors be located away from industrial facilities, even in urban areas. This ignores the basic fact that people must breathe in areas of high coarse particle concentrations, even if they do not live or work just over the fence line (and they do). Mounting evidence has shown that people who live adjacent to industrial facilities are more often minorities and those with lower socioeconomic status who are more likely to suffer from health conditions that place them most at risk.[10] Factory workers, restaurant workers, road workers, and many others breathe emissions in industrial areas. Schools, day care facilities, parks and playgrounds are often located alongside major highways. Population density should not be used as a sole criterion to restrict monitoring in areas of highest expected coarse particle concentrations. Similarly, locating monitors several hundred meters from heavily traveled roadways may not capture the higher concentrations that people may be exposed to closer to the road. Monitors should be located in areas with the highest expected concentrations, in areas with high population densities, and in rural areas.

[1] Lin M, Stieb DM, Chen Y. Coarse Particulate Matter and Hospitalization for Respiratory Infections in Children Younger Than 15 Years in Toronto: A Case-Crossover Analysis. *Pediatrics* 2005;116:235-240.
[2] Chen LH, Knutsen SF, Shavlik D, Beeson WL, Petersen F, Ghamsary M, Abbey D. The Association between Fatal Coronary Heart Disease and Ambient Particulate Air Pollution -- Are Females at Greater Risk? Available online August 2, 2005 at: http://ehp.niehs.nih.gov/members/2005/8190/8190.pdf.
[3] Becker S, Mundandhara S, Devlin RB, Madden M. Regulation of Cytokine Production in Human Alveolar Macrophages and Airway Epithelial Cells in Response to Ambient Air Pollution Particles: Further Mechanistic Studies. *Toxicol Appl Pharmacol* 2005 Jul 1; [Epub ahead of print].
[4] Brunekreef B, Forsberg B. Epidemiological Evidence of Effects of Coarse Airborne Particles on Health. *Eur Respir J* 2005; 26:309-318.
[5] Sandström T, Nowak D, and van Bree L. Health Effects of Coarse Particles in Ambient Air: Messages for Research and Decision-Making. *Eur Respir J* 2005; 26:187-188.
[6] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA 452/R-05-005. June 2005; and Letter from Dr. Rogene Henderson, Chair, Clean Air Scientific Advisory Committee to Stephen L Johnson, Administrator U.S. Environmental Protection Agency regarding Clean Air Scientific Advisory Committee (CASAC) Particulate Matter (PM) Review Panel's Peer Review of the Agency's *Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information* (Second Draft PM Staff Paper, January 2005); and *Particulate Matter Health Risk Assessment for Selected Urban Areas: Second Draft Report* (Second Draft PM Risk Assessment, January 2005). June 6, 2005, EPA-SAB-CASAC-05-007.
[7] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information, OAQPS Staff Paper. EPA 452/R-05-005. June 2005.
[8] U.S. EPA, Office of Air Quality Planning and Standards. Particulate Matter Health Risk Assessment for Selected Urban Areas. June 2005. pp. F-5 and F-6.
[9] U.S. EPA "Staff Paper" at p. 5-64.
[10] Institute of Medicine. Toward Environmental Justice Research, Education, and Health policy Needs, 1999. Washington, DC. National Academy Press; Perlin SA, Sexton K, Wong DW. An examination of race and poverty for populations living near industrial sources of air pollution. *J Expo Anal Environ Epidemiol* 1999, 9 (1): 29-48; Perline SA, Wong DW, Sexton K. Residential proximity to industrial sources of air pollution: interrelationships among race, poverty, and age. *J Air Waste Mange Assoc* 2001. 51 (3); 406-21.