

April 17, 2006

EPA Administrator Stephen L. Johnson
Air and Radiation Docket and Information Center
U.S. Environmental Protection Agency
Mailcode: 6102T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

RE: *Proposed National Ambient Air Quality Standards (NAAQS) for Particulate Matter—DOCKET ID NUMBER EPA-HQ-OAR-2001-0017*

Greetings:

As leading medical, nursing, public health, disease and patient advocacy organizations, we are deeply concerned that the Agency's recently proposed revisions to the primary and secondary National Ambient Air Quality Standards (NAAQS) for particulate matter do not adequately protect the public's health.^{1,2}

Agency Must Protect Public Health, Sensitive Populations

The NAAQS are health-based standards that require the EPA Administrator to identify pollutant "emissions ... which, in [the administrator's] judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare [and] ... the presence of which in the ambient air results from numerous or diverse mobile or stationary sources."³ The Administrator must assess "the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air."⁴ Finally, the Administrator must determine a primary NAAQS that is "requisite to protect the public health" with "an adequate margin of safety."

Congress intended NAAQS to "emphasize the preventive or precautionary nature of the Act, i.e. to assure that regulatory action can effectively prevent harm before it occurs."⁵ Inherent in its statutory mandate is the charge to EPA to protect vulnerable populations. The federal court with primary jurisdiction for the Clean Air Act has concluded that "in

¹ 42 U.S.C. §§ 7408-7409.

² Environmental Protection Agency (EPA). National Ambient Air Quality Standards for Particulate Matter. 71 Fed. Reg. 2620 (Jan. 17, 2006).

³ 42 U.S.C. § 7408(a)(1)(A)(B).

⁴ *Id.* § 7408(a)(2).

⁵ H.Rep. 294, 95th Cong., 1st Sess. 49-51 (1977).

its effort to reduce air pollution, Congress defined public health broadly. NAAQS must protect not only average healthy individuals, but also ‘sensitive citizens’ – children, for example, or people with asthma, emphysema, or other conditions rendering them particularly vulnerable to air pollution. If a pollutant adversely affects the health of these sensitive individuals, EPA must strengthen the entire national standard.”⁶ The Administrator must set the NAAQS low enough that, as far as possible given the current state of scientific and medical understanding, Americans that breathe air that meets the NAAQS can be assured their health and not suffer harm as a result.

Particulate Pollution Threatens Public Health

Most importantly, we wish to underscore what many of our scientists and health professional members have already communicated to EPA’s advisory committees and to the agency itself in public hearings convened in Philadelphia, Chicago, and San Francisco—the adverse public health impacts of fine and thoracic coarse particle pollution are extraordinarily severe and affect a wide cross-section of individuals and communities throughout the U.S. The annual toll, in morbidity, mortality, and cost to the health care system and to caregivers, ranks this readily controllable pollutant among the most serious ambient environmental exposures that affect human health and well-being.

More than 2,000 peer-reviewed studies have been published since the EPA originally promulgated the first NAAQS for particle pollution in 1996.⁷ Over the past nine years, EPA staff scientists and the EPA’s Clean Air Scientific Advisory Committee (CASAC) have engaged in an extensive review of the scientific underpinnings of the current PM standards and the implications of new research findings on ambient fine and coarse particle pollution for human health.^{8,9,10,11} It is clear from that review that adverse health effects – including asthma exacerbations, hospital admissions and premature deaths – are occurring at levels well below the current standards.¹² A consensus has emerged in the medical, nursing, scientific and public health communities that the current daily and annual average standards for fine particles are not protective of public health and must be substantially strengthened, and that a new standard for coarse particles is warranted.

⁶ *American Lung Association v. EPA*, 134 F.3d 388, 390 (D.C. Cir. 1998). See also *Lead Industries Assn, Inc. v. EPA*, 647 F.2d 1130, 1153 (D.C. Cir. 1980) (NAAQS must “be set at a level at which there is an ‘absence of adverse effect’ on these sensitive individuals”).

⁷ *Adverse Health Effects of Particulate Matter: New Science Shows Effects Below Current Standards*. Washington, DC: American Lung Association; 2005; 1.

⁸ U.S. EPA, Air Quality Criteria for Particulate Matter (October 2004).

⁹ U.S. EPA, OAQPS Staff Paper: Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information (June 2005).

¹⁰ U.S. EPA, EPA’s Review of the National Ambient Air Quality Standards for Particulate Matter (Second Draft PM Staff Paper, January 2005): A Review by the Particulate Matter Review Panel of the EPA Clean Air Scientific Advisory Committee (June 2005).

¹¹ U.S. EPA, Review of the EPA Staff Recommendations Concerning a Potential Thoracic Coarse PM Standard in the Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information (Final PM OAQPS Staff Paper) (September 2005).

¹² See e.g. U.S. EPA, EPA’s Review of the National Ambient Air Quality Standards for Particulate Matter (Second Draft PM Staff Paper, January 2005): A Review by the Particulate Matter Review Panel of the EPA Clean Air Scientific Advisory Committee (June 2005); 5.

Cardiovascular, Respiratory, and Cancer Health Impacts

A significant and growing body of clinical, epidemiological, and mechanistic research has substantially improved our understanding of the complex effects of ambient particle pollution on human cardiovascular and respiratory systems.¹³ The overwhelming weight of evidence to date orients PM pollution among the most harmful and pervasive ambient environmental contaminants to threaten human health.¹⁴ Short-term increases (over hours to days) in particle pollution have been linked to death from respiratory and cardiovascular causes, including strokes;^{15,16,17} increased numbers of heart attacks, especially among the elderly and in people with heart conditions;¹⁸ inflammation of lung tissue in young, healthy adults;¹⁹ increased hospitalization for cardiovascular disease, including strokes;^{20,21} and increased emergency room visits for patients suffering from acute respiratory ailments.²² Longer term (year-round) exposures to particle pollution have been linked to significant damage to the small airways of the lungs;²³ increased risk of dying from lung cancer;²⁴ and increased risk of death from cardiovascular disease.²⁵ Lives may be shortened by 1-2 years on average.²⁶

¹³ Brook, RD, et al. Air Pollution and Cardiovascular Disease: A Statement for Healthcare Professionals From the Expert Panel on Population and Prevention Science of the American Heart Association. *Circulation*, Jun 2004;109:2655-2671.

¹⁴ World Health Organization. *The World Health Report: 2002. Reducing Risks, Promoting Healthy Life* (2002); 68-69 (“Particulate air pollution (i.e. particles small enough to be inhaled into the lung) is consistently and independently related to the most serious [acute and chronic health] effects, including lung cancer and other cardiopulmonary mortality”).

¹⁵ Dominici F, McDermott A, Zeger SL, Samet JM. On the Use of Generalized Additive Models in Time-Series Studies of Air Pollution and Health. *Am. J. Epidemiol* 2002; 156:193-203.

¹⁶ Hong, Y.-C., Lee J.-T., Kim, H., Ha, E.-H., Schwartz, J., and Christiani, D.C. Effects of Air Pollutants on Acute Stroke Mortality. *Environ. Health Perspect.* Vol. 110, pp. 187-191, 2002.

¹⁷ Tsai SS, Goggins WB, Chiu HF, Yang CY. Evidence for an Association Between Air Pollution and Daily Stroke Admissions in Kaohsiung, Taiwan. *Stroke*. 2003; 34: 2612-6.

¹⁸ Zanobetti A, Schwartz J. The Effect of Particulate Air Pollution on Emergency Admissions for Myocardial Infarction: A Multicity Case-Crossover Analysis. *Environ Health Perspec* 2005; 113:978-982.

¹⁹ Ghio AJ, Kim C, Devlin RB. Concentrated Ambient Air Particles Induce Mild Pulmonary Inflammation in Healthy Human Volunteers. *Am J Respir Crit Care Med*. 2000; 162(3 Pt 1):981-8.

²⁰ Metzger KB, Tolbert PE, Klein M, Peel JL, Flanders WD, Todd K, Mulholland JA, Ryan PB, Frumkin H. Ambient Air Pollution and Cardiovascular Emergency Department Visits in Atlanta, Georgia, 1993-2000. *Epidemiology* 2004;15: 46-56.

²¹ Wellenius GA, Schwartz J, Mittleman MA. Air Pollution and Hospital Admissions for Ischemic and Hemorrhagic Stroke Among Medicare Beneficiaries. *Stroke* 2005; 36:2549-2553.

²² Peel JL, Tolbert PE, Klein M, Metzger KB, Flanders WD, Todd K, Mulholland JA, Ryan PB, Frumkin H. Ambient Air Pollution and Respiratory Emergency Department Visits. *Epidemiology* 2005; 16:164-174.

²³ Churg, A Brauer, M, Avila-Casado, MdC, Fortoul TI, Wright JL. Chronic Exposure to High Levels of Particulate Air Pollution and Small Airway Remodeling. *Environ Health Perspect* 2003; 111: 714-718.

²⁴ Pope CA, Burnett RT, Thun MJ, Calle EE, Krewski D, Ito K, Thurston GD. Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Air Pollution, *JAMA* 2002;287:9.

²⁵ Pope CA III, Burnett RT, Thurston GD, Thun MJ, Calle EE, Krewski D, Godleski JJ. Cardiovascular Mortality and Year-round Exposure to Particulate Air Pollution: epidemiological evidence of general pathophysiological pathways of disease. *Circulation*. 2004; 109:71-77.

²⁶ Brunekreef B. Air pollution and life expectancy: is there a relation? *Occup Environ Med* 1997; 54: 781-84.

Emerging Evidence Suggests Pediatric and Neurological Health Impacts

To ensure that all Americans breathe healthy air, the Clean Air Act's NAAQS provisions have been interpreted to require EPA to mitigate the health effects of ambient particle pollution on vulnerable populations, especially children.^{27,28} Children are acutely vulnerable to the hazardous effects of air pollution.²⁹ They tend to spend more time out of doors, they are often more physically active, they breathe more rapidly, their airways are narrower, and they inhale relatively more pollutants in proportion to their body weight.³⁰ Investigators have determined that the developing lung is highly vulnerable to environmental insult.³¹ As much as eighty percent of developing alveoli are formed postnatally, with greater permeability of the epithelial layer in young children and pediatric lung growth continuing into adolescence.³²

The results of recent studies that evaluate the subtle health effects of ambient particle pollution in pediatric and fetal populations are particularly troubling. Asthma incidence has risen precipitously among children, and although it is clear that asthma is a multifactorial disease, there is extensive evidence that particle pollution is associated with exacerbations of asthma and increased hospitalization for asthma among children.^{33,34} Children living on streets with heavy truck traffic were 60 to 90 percent more likely to report acute and chronic symptoms that include wheezing, phlegm, and diagnoses such as bronchitis and pneumonia.³⁵ A recent study also shows that the proximity of a child's school to major roads is linked to asthma, and the severity of a child's asthmatic symptoms increases with proximity to truck traffic.³⁶ Children raised in areas with higher fine particle levels have reduced lung capacity, prematurely aged lungs, and increased risk of bronchitis and asthma compared to peers living in less urbanized areas.^{37,38} Both

²⁷ *American Lung Association v. EPA*, 134 F.3d 388, 390 (D.C. Cir. 1998).

²⁸ See also U.S. Presidential Executive Order 13045—Protection of Children From Environmental Health Risks and Safety Risks. Fed. Reg. April 23, 1997 (Vol. 62, No. 78), at pp. 19883-19888.

²⁹ Committee on Environmental Health, American Academy of Pediatrics. Ambient Air Pollution: Health Hazards to Children. *Pediatrics* 2004;114:1699-1707.

³⁰ *Id.* and *Pediatric Environmental Health*, 2nd Ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003; 74-75.

³¹ *Id.*

³² *Id.* and Schwartz J. Air pollution and children's health. *Pediatrics*. 2004 Apr;113(4 Suppl):1037-43.

³³ Slaughter JC, Lumley T, Sheppard L, Koenig JQ, Shapiro, GG. Effects of Ambient Air Pollution on Symptom Severity and Medication Use in Children with Asthma. *Ann Allergy Asthma Immunol* 2003; 91:346-53.

³⁴ Lin M, Chen Y, Burnett RT, Villeneuve PJ, Kerwski D. The Influence of Ambient Coarse Particulate Matter on Asthma Hospitalization in Children: case-crossover and time-series analyses. *Environ. Health Perspect* 2002;110:575-581.

³⁵ Ciccone G, Fostastiere F, Agabati N, Biggeri A, Bisanti L, Chellini E. Road traffic and adverse respiratory effects in children. SIDRIA Collaborative Group. *Occup Environ Med* 1998;55:771-778.

³⁶ Kim JJ, Smorodinsky S, Lipsett M, Singer BC, Hodgson AT, Ostro B. Traffic-related air pollution near busy roads: the East Bay Children's Respiratory Health Study. *Am J Respir Crit Care Med* 2004; 170:520-526.

³⁷ Dockery DW, Speizer FE, Stram DO, Ware JH, Spengler JD. Effects of inhalable particles on respiratory health of children. *Am Rev Respir Dis* 1989;139:587-594.

³⁸ Peters J, Vol E, Gauderman WJ, Linn WS, Navidi W, London SJ, Margois H, Rappaport W, Vora H, Gong H, Thomas DC. A study of twelve southern California communities with differing levels and types of air pollution. II. Effects on pulmonary function. *Am J. Respir, Crit Care Med* 1999;159:768-775.

NO_x and particulate matter have been linked to a significant decrease in lung function growth among children living in southern California.³⁹ Impaired lung function has been associated with disease complications and death from disease in later adulthood.^{40,41}

Finally, though still an area of emerging concern, research indicating that particulate matter may adversely affect neurological health warrants precaution.^{42,43,44} Biologically plausible mechanisms that could link PM to neurological impacts include proinflammatory effects and cytokine production, likely through the generation of reactive oxygen species and oxidative stress;^{45,46,47} and the relatively high proportion of particulate matter made up of metals.⁴⁸ Diesel exhaust particles, a class of particulate matter associated with inflammation and oxidative stress in the lung and cardiovascular systems, have been identified as selectively toxic to dopaminergic neurons.⁴⁹

Annual Average PM_{2.5} Standard

The evidence of long-term effects of fine particles is strong and even more compelling than it was 9 years ago when the first PM_{2.5} standards were established. The major longitudinal cohort studies have been audited, replicated, reanalyzed, and extended and new long-term studies such as the California Children's Health Study have been completed.^{50,51} Long-term exposure to PM_{2.5} causes decreased lung function growth in

³⁹ Gauderman JW, McConnell R, Gilliland F, London S, Thomas D, Avol E, Vora H, Berhane K, Rappaport EB, Lurmann F. Association between air pollution and lung function growth in southern California children. *Am J Resp and Crit Care Med* 2000;162:1384-1390.

⁴⁰ Dezateux, C., and J. Stocks. Lung development and early origins of childhood respiratory illness. *Br. Med. Bull.* 1997; 53: 40-57.

⁴¹ Hole DJ, Watt GC, Davey-Smith G, Hart CL, Gillis CR, Hawthorne VM. Impaired lung function and mortality risk in men and women: findings from the Renfrew and Paisley prospective population study. *BMJ.* 1996 Sep 21;313(7059):711-5.

⁴² See e.g. EPA. Air Quality Criteria for Particulate Matter (October 2004) [Criteria Document], Volume II. 2004; 7-69-72 and 7-208.

⁴³ Calderon-Garciduenas L et al. Air pollution and brain damage. *Toxicol Pathol.* 2002 May-Jun;30(3):373-89.

⁴⁴ Calderon-Garciduenas L et al. Brain inflammation and Alzheimer's-like pathology in individuals exposed to severe air pollution. *Toxicol Pathol.* 2004 Nov-Dec;32(6):650-8.

⁴⁵ Nel A. Air pollution-related illness: effects of particles. *Science.* 2005 May; 308:804-6.

⁴⁶ Campbell A et al. Particulate matter in polluted air may increase biomarkers of inflammation in mouse brain. *Neurotoxicology.* 2005 Jan; 26(1):133-40.

⁴⁷ Liu X, Meng Z. Effects of airborne fine particulate matter on antioxidant capacity and lipid peroxidation in multiple organs of rats. *Inhal. Toxicol.* 2005 Aug; 17(9):467-73.

⁴⁸ Campbell, A. Inflammation, neurodegenerative diseases, and environmental exposures. *Ann. N.Y. Acad. Sci.* 2004; 1035: 117-132.

⁴⁹ Block M L et al. Nanometer size diesel exhaust particles are selectively toxic to dopaminergic neurons: the role of microglia, phagocytosis, and NADPH oxidase. *FASEB J.* 2004 Oct;18(13):1618-20. Epub 2004 Aug 19.

⁵⁰ Hoover BK, Foliart DE, White WH, Cohen AJ, Calisti LJ, Krewski D, Goldberg MS. Retrospective data quality audits of the Harvard Six Cities and American Cancer Society studies. *J Toxicol Environ Health A.* 2003 Aug 22-Oct 10;66(16-19):1553-61.

⁵¹ Gauderman WJ, Avol E, Gilliland F, et al. The effect of air pollution on lung development from 10 to 18 years of age. *N Engl J Med* 2004;351:1057-1067.

children, and mortality from cardiopulmonary diseases and lung cancer.^{52,53} Concentrations *below* current standards have been associated with premature death from heart and lung disease.^{54,55,56} Investigators recorded increased cough, bronchitis, and decreased lung function in children living in more polluted areas when long-term fine particle concentrations were at the level of the current standard.^{57,58}

The studies show increased risk down to the lowest levels studied, suggesting that an annual average standard of 12 $\mu\text{g}/\text{m}^3$, as adopted by California in 2002, or below, is warranted. Further, our organizations support the elimination of spatial averaging, because it is inappropriate to allow an area with high monitored concentrations to average its way into compliance.

Daily PM_{2.5} Standard

Hundreds of studies from around the world have now demonstrated that short-term exposure to fine particle pollution causes mortality from cardiopulmonary diseases, hospitalization and emergency room visits for cardiopulmonary diseases, increased respiratory symptoms, decreased lung function, and cardiac effects.⁵⁹ An annual standard alone is not sufficient to protect against these adverse effects, nor the effects of more acute, sub-daily exposures. As particulate air pollution rises, research has shown that increased concentrations are followed by an increase in adverse effects the next day, or over several days.^{60,61} Moreover, short-term exposures *below* current standards have been shown to adversely affect human health, including increases in daily deaths in the

⁵² Gauderman, WJ, Gilliland GF, Vora H, Avol E, Stram D, McConnell R, Thomas D, Lurmann F, Margolis HG, Rappaport EB, Berhane K, Peters JM. Association between Air Pollution and Lung Function Growth in Southern California Children: Results from a Second Cohort. *Am. J. Respir. Crit. Care Med* 2002; 166:76-84.

⁵³ Brunekreef B, Holgate ST. Air pollution and health. *Lancet*. 2002 Oct 19;360(9341):1233-42.

⁵⁴ Pope CA, Burnett RT, Thun MJ, Calle EE, Krewski D, Ito K, Thurston GD. Lung Cancer, Cardiopulmonary Mortality, and Long-Term Exposure to Fine Particulate Air Pollution, *JAMA* 2002;287:9.

⁵⁵ Laden F, Schwartz J, Speizer FE, Dockery DW. Reduction in Fine Particulate Air Pollution and Mortality: Extended Follow-up of the Harvard Six Cities Study. *Am J Respir Crit Care Med* 2006; Published online January 19, 2006 as doi:10.1164/rccm.200503-443OC.

⁵⁶ Krewski D, Burnett RT, Goldberg MS, Hoover K, Siemiatycki J, Jerrett M, Abrahamowicz M, White WH. Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of particulate air pollution and mortality. 2000. Cambridge, MA: Health Effects Institute.

⁵⁷ Gauderman WJ, Gilliland GF, Vora H, Avol E, Stram D, McConnell R, Thomas D, Lurmann F, Margolis HG, Rappaport EB, Berhane K, Peters JM. Association between Air Pollution and Lung Function Growth in Southern California Children: results from a second cohort. *Am J Respir Crit Care Med* 2002;166:76-84.

⁵⁸ Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, McConnell R, Kuenzli N, Lurmann F, Rappaport E, Margolis H, Bates D, Peters J. The effect of air pollution on lung development from 10 to 18 years of age. *NEJM* 2004;351:1057-67.

⁵⁹ See e.g. Peters A, Dockery DW, Muller JE, Mittleman MA. Increased particulate air pollution and the triggering of myocardial infarction. *Circulation*. 2001 Jun 12;103(23):2810-5.

⁶⁰ See e.g. Peters A, von Klot S, et al. Exposure to traffic and the onset of myocardial infarction. *New Eng J Med* 2004;351:1721-1730.

⁶¹ Peters A, Dockery DW, Muller JE, Mittleman MA. Increased particulate air pollution and the triggering of myocardial infarction. *Circulation*. 2001;103:2810-2815.

eight largest Canadian cities;⁶² increases in deaths from cardiovascular causes in Phoenix;⁶³ and PM_{2.5}-linked mortality in Santa Clara County, California.⁶⁴

The current daily average PM_{2.5} standard of 65 µg/m³ is so weak that EPA could propose to lower it by over one-third, without reducing the residual risk of premature death under the current standards.⁶⁵ Based on scientific studies showing effects at low concentrations, our organizations support a daily PM_{2.5} standard of 25 µg/m³, or below, to protect public health. In addition, for a standard designed to limit high daily concentrations, the 98th percentile form of the standard simply allows too many high pollution days to go unregulated. EPA's risk analysis indicates that a 99th percentile form of the standard would provide substantial additional health protection in every city analyzed.⁶⁶

EPA Must Strengthen *Both* the Annual Average and 24-hour PM_{2.5} Standards in Order to Protect the Public from Health Effects of Short- and Long-Term Exposures

To adequately protect citizens across the country, both the annual average and 24-hour standards need to be tightened substantially. EPA analyses show that when the 24-hour average standard is fixed at 30 µg/m³ or higher, the number of nonattainment counties in the Northeast, Southeast and Midwest increases substantially when the annual standard is tightened from 13 to 12 µg/m³. Thus a tighter annual standard is needed to protect human health in these regions, even if the 24-hour standard is tightened.

At the same time, the need for direct limits on 24-hour average concentrations is also clear from analyses showing that the number of nonattainment counties in the Southwest and Northwest increases dramatically as the 98th percentile 24-hour standard is lowered from 40 to 25 µg/m³, regardless of the level of the annual standard. Given no evidence for a threshold in short-term PM mortality effects that is above 20 to 25 µg/m³ it appears that many people

⁶² Burnett RT, Brook J, Dann T, Delocla C, Philips O, Cakmak S, Vincent R, Goldberg MS, Krewski D. Association between particulate- and gas-phase components of urban air pollution and daily mortality in eight Canadian cities. *Inhal Toxicol* 2000;12 Suppl 4:15-39. Burnett RT Goldberg MS. Size-fractionated particulate mass and daily mortality in eight Canadian cities. In: Revised analyses of time-series studies of air pollution and health. Special report. 2003. Boston, MA: Health Effects Institute; pp. 85-90.

⁶³ Mar TF, Norris GA, Koenig JQ, Larson TV. Associations between air pollution and mortality in Phoenix, 1995-1997. *Environ Health Perspect* 2000;108:347-53. Mar TF, Norris GA, Larson TV, Wilson WE, Koenig JQ. Air pollution and cardiovascular mortality in Phoenix, 1995-1997. In: Revised analyses of time-series studies of air pollution and health. Special report. 2003. Boston, MA: Health Effects Institute; pp. 85-90.

⁶⁴ Fairley D. Daily mortality and air pollution in Santa Clara County, California: 1989-1996. *Environ Health Perspect* 1999;107:637-41. Fairley D. Mortality and air pollution for Santa Clara County, California, 1989-1996. In: Revised analyses of time-series studies of air pollution and health. Special report. 2003. Boston, MA: Health Effects Institute; pp. 85-90.

⁶⁵ Derived from U.S. EPA, Particulate Matter Health Risk Assessment for Selected Urban Areas. June 2005.

⁶⁶ Shprentz D. Consultant to the American Lung Association. Statement on the Second Draft OAQPS Staff Paper on the Review of National Ambient Air Quality Standards for Particulate Matter before the Clean Air Scientific Advisory Committee (CASAC). April 6, 2005 at 4.

in the Southwest especially would not be protected from serious health impacts unless the 24-hour standard is set at a level of 25 µg/m³ or lower.^{67,68}

Coarse Particle Standard

The evidence is persuasive that coarse particles contribute to increased risk of hospitalization for heart and lung disease,⁶⁹ increased respiratory symptoms,⁷⁰ and decreased lung function,⁷¹ and may also contribute to premature mortality.⁷² Since the publication of the final EPA Staff Paper in late June 2005, five important new studies are now available, including a major review article, reporting short-term effects of coarse particle pollution on respiratory hospital admissions in children and the elderly, and increased long-term risk of death from coronary heart disease in women.^{73,74,75,76,77}

Brunekreef et al. conclude 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.”⁷⁸ The review also found support for an association between coarse particle pollution and cardiovascular hospital admissions.

EPA is proposing to replace the existing standard for coarse particles, which had been defined as particles less than 10 microns in size, with a standard for a new size range,

⁶⁷ U.S. EPA. 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.

⁶⁸ Johnson PRS, Graham JJ. Analysis of Primary Fine Particle National Ambient Air Quality Standard Metrics. *JAWMA*. In press.

⁶⁹ Zanobetti A, Schwartz J, Samoli E, et al. The temporal pattern of respiratory and heart disease mortality in response to air pollution. *Environ Health Perspect*. 2003; 111: 1188–1193.

⁷⁰ Mar TF, Larson TV, Stier RA, Claiborn C, Koenig JQ. An analysis of the association between respiratory symptoms in subjects with asthma and daily air pollution in Spokane, Washington. *Inhalation Toxicology* 2004;16:809-815.

⁷¹ Gauderman WJ, McConnell R, Gilliland F, London S, Thomas D, Avol E, Vora H, Berhane K, Rappaport EB, Lurmann F, Margolis HG, Peters J. Association between air pollution and lung function growth in southern California children. *Am J Respir Crit Care Med*. 2000 Oct;162(4 Pt 1):1383-90.

⁷² Lippmann, M., Ito, K., Nádas, A., and Burnett, R.T. Association of Particulate Matter Components with Daily Mortality and Morbidity in Urban Populations. *Health Effects Institute Research Report*, Number 95, August 2000.

⁷³ 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.

⁷⁴ 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.

⁷⁵ 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? *Environ Health Perspect*. 2005. 113: 1723-9.

⁷⁶ 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. 207(2 Suppl):269-75

⁷⁷ Chen Y, Qiuying Y, Krewski D, Burnett RT, Shi Y, McGrail KM. The Effect of Coarse Ambient Particulate Matter on First, Second, and Overall Hospital Admissions for Respiratory Disease Among the Elderly. *Inhalation Toxicology* 2005; 17:649-655.

⁷⁸ Brunekreef B, Forsberg B. Epidemiological Evidence of Effects of Coarse Airborne Particles on Health. *Eur Respir J* 2005; 26:309-318.

from 2.5 to 10 microns. This new standard would be limited to urban areas and would exempt agriculture and mining from controls aimed at meeting the standard. Under the Clean Air Act, EPA is required to issue uniform air quality standards that protect all Americans with an adequate margin of safety. These standards must be precautionary in nature. There is no basis in law or science for EPA's proposal to limit standards to urban areas and to issue blanket exemptions for major industrial sectors. It is imperative that all Americans be protected from this pollutant, whether they live in large cities, small towns, near mining operations or around farmland. We disagree strongly with the decision to exempt coarse particles from agriculture and mining sources, and to exclude communities with populations under 100,000 people from protection, and from monitoring requirements.

Our organizations support a daily average PM_{10-2.5} standard in the range of 25-30 µg/m³ or below, 99th percentile, in order to protect public health. We support basing the standard on particle size.

Agency Departed From Recommended Standards

Many medical societies and public health groups have repeatedly urged EPA to follow the science and set tough new standards. Our colleagues in the health and medical community, including the American Public Health Association, the American Academy of Pediatrics, the American Thoracic Society, and the American College of Cardiology have recommended that EPA select the most protective levels of the standard analyzed.⁷⁹ Most recently, 104 leading air pollution researchers and physicians wrote EPA Administrator Stephen Johnson, also recommending the most protective levels.⁸⁰

The EPA's own Children's Health Protection Advisory Committee (CHPAC) has recommended that EPA "revise the National Ambient Air Quality Standards (NAAQS) for particulate matter downwards to a level that would significantly reduce health effects in infants and children."⁸¹ Unfortunately EPA has ignored this advice and proposed a standard that will not adequately protect the public. Regrettably, the Agency also ignored its own staff scientists and the recommendations of EPA's Clean Air Scientific Advisory Committee (CASAC).^{82,83} In both instances, the full recommendations of its advisors

⁷⁹ Letter to Stephen L. Johnson, Administrator, United States Environmental Protection Agency, (September 30, 2005) from the American Thoracic Society, American College of Cardiology, American College of Preventative Medicine, American Association of Cardiac and Pulmonary Rehabilitation, and the National Association of Medical Direction of Respiratory Care; Letter to Stephen L. Johnson, Administrator, United States Environmental Protection Agency (October 21, 2005) from the American Academy of Pediatrics.

⁸⁰ Letter to Stephen L. Johnson, Administrator, United States Environmental Protection Agency (December 5, 2005) from Joel Schwartz, Ph.D. et al.

⁸¹ Letter to Stephen L. Johnson, Administrator, United States Environmental Protection Agency from the EPA Children's Health Protection Advisory Committee (August 8, 2005); 1.

⁸² U.S. EPA, OAQPS Staff Paper: Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information (December 2005).

⁸³ U.S. EPA, EPA's Review of the National Ambient Air Quality Standards for Particulate Matter (Second Draft PM Staff Paper, January 2005): A Review by the Particulate Matter Review Panel of the EPA Clean Air Scientific Advisory Committee (June 2005).

were more health-protective than the standards EPA has proposed. EPA models for nine major cities estimate that the strongest daily and annual standards recommended by the CASAC would cut the approximately 4,700 annual PM-linked deaths in those cities by 48%, while the agency's proposal to tighten the daily standard in isolation would reduce PM-linked deaths by only 22%.⁸⁴ By EPA's own admission, public health is less well-protected under the agency's proposal than under its advisors' recommended alternative.

Conclusion

We urge you to set the following health-based NAAQS for particulate matter:

- **Annual average PM_{2.5} standard of 12 µg/m³**
- **24-hour average PM_{2.5} standard of 25 µg/m³ (99th percentile)**
- **24-hour average PM_{10-2.5} standard of 25-30 µg/m³ (99th percentile), applied equally to all areas of the country and to all types of particles.**

The EPA risk assessment focusing on just nine U.S. cities indicates that 4,700 premature deaths would occur each year even after these cities meet current PM_{2.5} standards. Reducing both the annual average and 24-hour standards for PM_{2.5} as suggested above would substantially reduce excess deaths from PM_{2.5} pollution in these nine cities. The national reduction in deaths and illnesses will be significant. In the case of coarse particles, even at the bottom of EPA's proposed range there is no reduction of health risk, indicating that the standard should be set below the range proposed in the Staff Paper.

We urge the Environmental Protection Agency to propose revisions to the particulate NAAQS that will be fully protective of public health, as required by the Clean Air Act. There is strong scientific consensus for moving forward with greatly strengthened standards. The standards we have outlined above are necessary to protect sensitive groups including infants, children, the aged, and those with heart disease, lung disease, and diabetes – which together comprise a significant proportion of the U.S. population. The life and health of hundreds of thousands of Americans is at stake.^{85,86}

⁸⁴ Stokstad, E. Environmental Regulation: New Particulate Rules are Anything but Fine, Say Scientists. *Science*. 2006 Jan 6; 311(5757): 27.

⁸⁵ Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004 Mar 10;291(10):1238-45.

⁸⁶ Johnson P, Graham J. Fine particulate matter national ambient air quality standards: public health impact on populations in the northeastern United States. *Environ Health Perspect*. 2005 Sep;113(9):1140-7.

SIGNING ORGANIZATIONS

American Association on Mental Retardation
American Cancer Society
American College of Nurse-Midwives
American Diabetes Association
American Heart Association
American Lung Association
American Nurses Association
American Public Health Association
Asthma and Allergy Foundation of America
Center for Children's Health and the Environment,
Mount Sinai School of Medicine
Children's Environmental Health Network
Easter Seals
Health Care Without Harm
Institute for Children's Environmental Health
National Latina Institute for Reproductive Health
National Research Center for Women & Families
Physicians for Social Responsibility
Science and Environmental Health Network
The Arc of the United States
The Learning Disabilities Association of America
Trust for America's Health