

Children's Health Protection Advisory Committee

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May 19, 2014

H. Christopher Frey PhD
Chair
US EPA Clean Air Scientific Advisory Committee

RE: CASAC Review of the Health Risk and Exposure Assessment for Ozone and Policy Assessment for the Review of the Ozone NAAQS: Second External Review Drafts

Dear Dr. Frey:

I appreciate the opportunity to comment on the review of US EPA's second drafts: Health Risk and Exposure Assessment and Policy Assessment for the Review of the National Ambient Air Quality Standard (NAAQS) for 8 hour exposure to ozone. In 2007, the US EPA Children's Health Protection Advisory Committee (CHPAC) submitted two letters to Administrator Johnson that highlighted scientific findings regarding ozone-related children's health effects and urged him to support an ozone standard of 60ppb in order to adequately protect children's health with a sufficient margin of safety. I am writing now to strongly re-affirm the recommendation of 60ppb based on the expanding scientific evidence base documenting adverse childhood health impacts in relation to ambient ozone exposure. The higher end of the range, 60ppb – 70ppb, put forth by the Clean Air Scientific Advisory Committee (CASAC) in 2007 will not be sufficient to protect children's health.

Children suffer a disproportionate burden of ozone-related health impacts due to critical developmental periods of lung growth in childhood and adolescence that can result in permanent disability. In addition, children have increased susceptibility due to increased ventilatory rates and increased outdoor physical activity compared with adults. The 6.8 million children suffering from asthma in the US are some of the most vulnerable to ozone-related respiratory impacts (CDC, 2014). The US EPA 2013 Ozone Integrated Science Assessment summarized numerous recent epidemiologic studies that cite relationships between ambient ozone exposure concentrations within and even below the CASAC previously proposed range, 60-70 ppb, and adverse childhood health impacts including: increased asthma exacerbations, impaired lung development, changes in birth outcomes, and increased upper respiratory illness (US EPA, 2013). Therefore, the current scientific evidence base documenting ozone-related childhood health impacts is now expanded and stronger compared to the last review and warrants a lower recommended range of standards to adequately protect children's health and well-being.

One concrete example of how children's health will be positively impacted by a lower standard is outlined in the 2014 EPA Second Draft Policy Assessment for the Review of Ozone NAAQS (US EPA, 2014). It estimates that 14-19% of children (approximately 952,000 – 1,292,000 asthmatic children based on CDC statistics) living in urban centers will have a greater than 10% decrement in lung function based on a standard of 75ppb, and this percentage decreases to 5-11% (approximately 340,000 – 748,000 asthmatic children based on CDC statistics) with a 60ppb standard. The reduction from 75ppb to 60ppb would translate to approximately 500,000 fewer children affected by ozone exposure. Therefore, the reduced standard would result in significant quantifiable children's health protections, and this is only one example of the numerous childhood health protections afforded.

Based on the strengthened scientific evidence reporting adverse childhood-related health impacts at concentrations above 60ppb, I strongly re-affirm the original 2007 CHPAC recommendations to set the NAAQS ozone standard for 8 hour exposure to 60ppb in order to adequately protect children's health. I thank you for considering this recommendation and have included the previous CHPAC letters for your reference. I would be happy to provide any further information as needed.

Sincerely,

Sheela Sathyanarayana MD MPH
Chair, Children's Health Protection Advisory Committee (CHPAC)

Enclosures: March 23, 2007 CHPAC Letter re: Ozone NAAQS
September 4, 2007 CHPAC Letter re: Ozone NAAQS

cc: Janet McCabe, Office of Air and Radiation
Steve Page, Office of Air Quality Planning and Standards
Khesha Reed, Office of Children's Health Protection

References:

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March 23, 2007

Stephen L. Johnson, Administrator
 United States Environmental Protection Agency
 1200 Pennsylvania Avenue, N.W.
 Washington, D.C. 20460

RE: Review of the NAAQS for Ozone: Policy Assessment of Scientific and Technical Information

Dear Administrator Johnson:

The Children's Health Protection Advisory committee (CHPAC) appreciates this opportunity to provide comments to you on the EPA staff paper that has been prepared in advance of determining the proposed revisions to the National Ambient Air Quality Standard (NAAQS) for ozone. The committee commends the EPA scientists for a very thorough analysis of the literature on ozone health effects. CHPAC supports lowering the 8 hour ozone standard and setting the level of precision of the standards at the thousandths of parts per million (ppm). We further recommend setting the proposed standard at the lowest value of the range offered by the staff paper (0.060 ppm), a level which is supported by the scientific literature. We also express our concerns about the decisions to exclude the consideration of certain risks and certain subpopulations of children from the risk analysis, which results in an underestimation of the full impacts of ozone exposure.

Children have higher exposures to air pollutants than adults in the same setting as they are more physically active, have higher ventilation rates, and more frequently play outdoors. The lung grows extensively after birth, with about 80% of the alveoli developing during childhood and adolescence. Thus, the developing lung is more susceptible to damage from air pollutants like ozone than the mature lung¹. A number of epidemiological studies of children have associated adverse respiratory effects with exposure to ozone, even at levels below the current standard. Asthmatic children, who now number over six million², are particularly vulnerable and have been frequently studied for adverse effects from ozone exposure. These effects include exacerbation of asthma^{3,4,5} and increased emergency department visits for asthma.^{6,7,8} Higher ozone exposures have also been associated with increased school absenteeism.⁹ Adverse health impacts have been noted in children under 5, including infants^{10,11}. One cohort study of children reported

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induction of asthma in active children in high ozone communities.¹² A few studies have found decreased lung capacity in young adults growing up in higher ozone communities.^{13,14,15} Chamber studies in healthy young adults demonstrate exposure to as low as 0.06 ppm ozone for 6.6 hours results in decrements in lung function in some individuals,¹⁶ while 0.08 ppm produces both statistically significant lung function decrement^{17,18} and airway inflammation¹⁸. In contrast to these healthy young adults, children with asthma would be expected to be more susceptible to ozone. Children with severe asthma are especially sensitive to ozone, experiencing shortness of breath and needing additional asthma rescue medication at levels of ozone below the current standard.¹⁹

Therefore, our recommendations are:

1. We urge that the lower- and more child protective- value of 0.060 ppm be selected from the range suggested by the CASAC.

The CHPAC is in full agreement with the Clean Air Scientific Advisory Committee (CASAC) and the EPA staff paper that the current form and level of the ozone standard is not adequately protective of public health, either for children or for adults. As noted above, children are especially vulnerable to asthma exacerbation and stunted lung development from ozone exposures. The scientific literature demonstrates that susceptible children experience significant adverse health effects well below the current standard, and even at levels below the range of standards under consideration.^{5,10,19} Therefore, in order to be more protective of the respiratory health of susceptible children, the committee recommends that the EPA choose a standard of 0.060 ppm, the low end of the range offered in the staff paper.

2. We support the form of the new standard to be specified to the thousandths of ppm.

Under the current form of the standard, rounding of the thousandths digit of monitoring data allows populations to be exposed to levels of 0.084 ppm without exceeding the standard. The new ozone standard should be specified to the thousandths, in keeping with the precision of the monitors themselves, to prevent this overexposure.

3. Children experience a wide variety of health impacts from ozone exposure that should be recognized in considering benefits from lowering the 8 hour ozone standard.

A number of specific outcomes have been omitted from the risk assessment in the Staff Paper, including school absences, doctor visits, medication use, and decreased resistance to infections. In addition, risks to children under 5 are not considered, with the exception of respiratory symptoms in one city only. These endpoints, as well as the risks experienced by children under 5, contribute to the physical, emotional and economic burden associated with children's exposure to ozone. Their exclusion underestimates the true benefits of reducing ozone exposure. This tendency towards underestimation of the health benefits should be appropriately recognized in setting the standard and emphasizes the need to be more protective.

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Conclusions and recommendations

In summary, in order to afford greater protection to children, we strongly recommend setting the proposed standard at 0.060 ppm, the lowest value of the range offered by the staff paper, and a level which is supported by the scientific literature. We thank you in advance for considering these comments and would be happy to discuss them with you or your staff.

Sincerely,



Melanie A. Marty, Ph.D., Chair
Children's Health Protection Advisory Committee

Cc: William Wehrum, Designated Assistant Administrator, Office of Air and Radiation
Steven Page, Office of Air Quality Planning and Standards
Lydia Wegman, Office of Air Quality Planning and Standards
Dr. William Sanders, Interim Director, Office of Children's Health Protection

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4 September 2007

Stephen L. Johnson, Administrator
 United States Environmental Protection Agency
 1200 Pennsylvania Avenue, N.W.
 Washington, D.C. 20460

RE: Proposed NAAQS for Ozone

Dear Administrator Johnson:

The Children's Health Protection Advisory committee (CHPAC) appreciates the opportunity to provide comments to you on the EPA's proposed revisions to the National Ambient Air Quality Standard (NAAQS) for 8-hour exposure to ozone. We commend you for publicly declaring that the current ozone standard of 0.08 ppm is not sufficient to protect public health, and for specifying the proposed standard to three significant digits, instead of the current two (Federal Register Vol. 72, No. 132, July 11, 2007). We believe, however, that the proposed range (0.070-0.074 ppm) does not adequately protect the 73.7 million children in the U.S. (America's Children: Key National Indicators of Well-being, 2007) from ozone-related harm.

As pediatricians, public health and environmental professionals drawn from academia, government, industry and public interest organizations, we would like to again express our unanimous opinion that the 8 hour ozone standard should be set at the lowest level offered by the Clean Air Scientific Advisory Committee (CASAC), 0.060 ppm, in order to adequately protect the health of children with an appropriate margin of safety (CHPAC letter, March 23, 2007). This opinion is based on the existing scientific studies of children, which demonstrate serious adverse health effects of ozone exposure, including exacerbation of asthma with attendant increases in medication use, hospitalization, and missed school days, and impairment of normal lung development. It is also based on consideration of the evidence that disruption of lung development may result in permanent health consequences in children exposed to ozone.

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Nearly nine percent (6.5 million) of our nation's children are currently diagnosed with asthma, and in 2004, children were hospitalized 198,000 times, missed an estimated 12.8 million days of school, and 186 children died from asthma (CDC FASTTATS; <http://www.cdc.gov/nchs/data/ad/ad381.pdf>). Animal evidence showing that ozone disrupts normal lung function and structure in a way that predisposes to asthma (Plopper et al., 2007) lends further biological plausibility to the studies showing causation of asthma and disrupted lung function in children. With such a high proportion of the nation's children in a sensitive state due to asthma, the need to choose a standard that protects public health with an adequate margin of safety is heightened. We believe that a standard in the proposed range of 0.070 to 0.074 does not provide an adequate margin of safety. Furthermore, only the lowest value (0.070 ppm) is a part of CASAC's recommended range. We would like to present further justification for our original recommendation to choose the lowest value of the CASAC's recommended range (0.060 ppm).

Children are especially susceptible to ozone exposures because they have higher levels of physical activity, higher ventilation rates, and more frequent outdoor activities on average than adults in the same setting. Furthermore, the lungs undergo extensive development during childhood and adolescence, making children especially vulnerable to permanent alteration in lung function and chronic lung disease later in life if their normal development is disturbed. Epidemiological studies have shown that exposure to levels of ozone below the current standard during this critical period is associated with adverse respiratory effects, including impairment of lung development (Tager et al, 2005; Kunzli et al., 1999; Galizia and Kinney, 1999), and asthma exacerbation (Tolbert et al., 2000; Gent et al. 2003).

Several studies also demonstrate significant adverse effects occurring in children below the range of values proposed by the agency. The incidence of new asthma diagnoses among active children was associated with daytime average ozone levels from 0.056 to 0.069 ppm (McConnell, 2002.). Infants had higher incidence of disordered breathing associated with ozone in a study with a mean 8-hour ozone exposure of 0.055 ppm (Triche et al., 2006). Moreover, in adults exposed to ozone levels below the current standard and the proposed range for the revised standard, there is evidence of serious health effects, including premature mortality (Bell et al., 2005, 2006; Levy et al., 2005).

We are concerned that, in determining the range of the proposed standard, too much emphasis has been placed on the chamber studies, including the Adams study indicating effects in a subset of healthy adults at levels of 0.060 ppm (Adams, 2006), and not enough on the epidemiology studies. Chamber studies do not provide adequate insight into critical responses to low level ozone exposures among children and other vulnerable subgroups. While such studies have the ability to more tightly control exposure, they do not measure the effects of chronic exposures, and they are limited by small sample size and the inability to include vulnerable subpopulations, including infants and moderately to severely asthmatic children, as subjects. Thus, over-reliance on chamber studies may mean the standard does not reflect the dose-response

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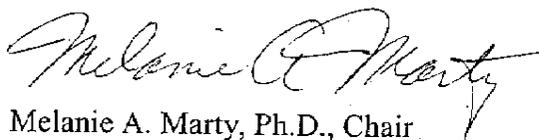
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characteristics of chronic effects nor the most sensitive subpopulations, and may therefore be set too high.

While recognizing that achieving full compliance with a tighter standard may be challenging for some geographical areas, we fully support your stated commitment to consider implementation issues separately from the setting of this standard, which is to be based solely on the merits of the health science. It is especially important, in tightening ozone standards, that EPA make an effort to help states and localities achieve compliance, and we urge the Agency to consider new national controls and programs that would result in the reduction of ozone precursors.

In conclusion, considering the documented serious effects of ozone on children's health, the committee unanimously recommends that the Administrator lower the 8-hour ozone standard to 0.060 ppm. We thank you in advance for considering our recommendations, and would be happy to discuss these comments with you or your staff.

Sincerely,



Melanie A. Marty, Ph.D., Chair
Children's Health Protection Advisory Committee

Cc:

William Wehrum, Designated Assistant Administrator, U.S. EPA Office of Air and Radiation
Steven Page, Director, U.S. EPA Office of Air Quality Planning and Standards
Lydia Wegman, Director, U.S. EPA Office of Air Quality Planning and Standards, Health and Environmental Impacts Division
William H. Sanders, III, Dr.P.H., Acting Director, Office of Children's Health Protection and Environmental Information

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