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Scientific Evidence Supports Stronger Limits on Ozone

In 2007, 2010, and now again in 2015, the American Thoracic Society has recommended that the U.S. Environmental Protection Agency (EPA) adopt an 8-hour ozone national ambient air quality standard of 60 ppb to adequately protect public health (1, 2). Although the recommended standard endorsed by the American Thoracic Society has not changed during this time, the scientific evidence supporting this recommendation has significantly strengthened. The scientific evidence available 7 years ago justifying this recommendation has been supplemented by an even greater understanding of the health effects of ozone exposures, including infant respiratory problems, worse childhood asthma control, reduced lung function, and increased mortality in adults.

On November 25, 2014, the EPA proposed a standard in the range of 65–70 ppb, which is lower than the current standard of 75 ppb (the standard is defined as the annual fourth highest maximum daily 8-hour ozone average averaged over 3 years). Although we applaud the EPA for proposing a stricter standard, we believe the scientific evidence clearly calls for a standard of 60 ppb to protect human health. We are currently in the public comment period for the proposed ozone rule and urge the EPA to issue a more protective standard of 60 ppb. This is the second time the Obama Administration has reviewed the current ozone standard of 75 ppb. The previous administration established the current standard outside the range recommended by the Clean Air Science Advisory Committee of 60–70 ppb (3). In 2010, the Clean Air Science Advisory Committee reaffirmed its initial recommendation as part of an early reassessment of the ozone standard, an effort that was ultimately abandoned in 2011 (4). Because a new science assessment was not conducted as part of that review, the current review of the ozone standard is the first to consider new scientific evidence since 2006.

Since 2006, much more evidence has accumulated that ozone exposures in the range of 60–75 ppb have adverse physiologic effects across the entire age spectrum, from infants to older adults. Although there is also some evidence of health effects of ozone exposure below 60 ppb, the strongest evidence supports the conclusion that serious adverse health effects occur across all ages at levels above 60 ppb.

Highlights of this new body of evidence include a study of emergency department visits among children aged 0 to 4 years in Atlanta, Georgia, which found that each 30-ppb increase in the 3-day average of ozone was associated with an 8% higher risk of pneumonia and a 4% higher risk for upper respiratory infection (5). Several studies have demonstrated dose–response relationships between ozone exposure and childhood asthma admissions at exposure levels in the 60–80 ppb range (6–9). Similar associations have been found for adult admissions for asthma (9–11) and chronic obstructive pulmonary disease (12, 13). A population-based cohort study of generally healthy adults found that FEV_1 was 56 ml lower after days

when ambient ozone ranged from 59 to 75 ppb compared with days with levels lower than 59 ppb (14). Controlled human exposure studies have reaffirmed lung function decrements in healthy adults after exposure to 60–70 ppb of ozone (15, 16). Perhaps of greatest concern, there is now stronger evidence of increased mortality in association with ozone (17–19), particularly among the elderly and those with chronic disease (20, 21).

In making this recommendation, we acknowledge that challenges exist in reducing ambient ozone concentrations. Unlike other pollutants regulated by the Clean Air Act, ozone is a secondary pollutant formed from precursor pollutants through photochemical reactions in the atmosphere. This presents challenges in designing successful abatement plans. For example, the natural presence of precursor chemicals and long-range transport of ozone from beyond U.S. jurisdictional boundaries can each contribute to background ozone levels (22). However, the adverse health effects of ozone do not discriminate on the basis of the source of precursor pollutants, nor do these complexities change the reality that serious adverse health effects occur at concentrations higher than 60 ppb. Although the science surrounding background ozone is still emerging, the evidence of adverse health risks of ozone is clear.

Another challenge for ozone management is that the secondary formation of ozone can result in higher concentrations downwind from the primary sources of precursor pollutants, cutting across jurisdictions. As a result, integrated planning across jurisdictional boundaries and compliance with the "good neighbor" provision of the Clean Air Act will be necessary to reduce regional ozone to levels that adequately protect public health (23).

Although controlling ambient ozone will be a challenge, it will also present opportunities for innovation and leadership. State Implementation Plans will vary in how counties across the United States plan to remediate unhealthy levels of ozone. Although all plans will take time to achieve the needed results, the best approaches will be identified and serve as a model that other regions can follow to protect public health.

The timing is excellent for revision of the ozone standard to 60 ppb, as the new standard can build on substantial recent progress. In March 2014, the EPA finalized new standards for motor vehicle emissions and cleaner fuels that are expected to reduce ozone levels significantly (24). Already-adopted revisions to standards for particulate matter and air toxics are also likely to further reduce ozone formation (25). Above all, however, we are entering an era of technological innovation, infrastructure reconstruction, and commitment to sustainability in which obsolete technologies are being replaced by more efficient and less-polluting innovations. This is exactly the right time to lay down the correct performance criteria and design specifications for the new technology before we commit to a new energy and transportation regime that could limit our choices in the future.

The U.S. EPA has taken significant actions in the past when justified by scientific evidence, most notably by reducing the permissible concentrations of airborne lead by 90% in 2008 and reducing the permissible annual concentrations of fine particle pollution by 20% in 2013 (26). We encourage the EPA administrator, with the full support of the president, to acknowledge the large body of scientific evidence documenting the harms caused by ozone pollution and set a standard of 60 ppb to protect the health of the American public. ■

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