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Mr. Chairman, Members of the Committee, thank you for inviting me to discuss the effect on agriculture of Environmental Protection Agency's (EPA's) revisions to the national ambient air quality standards for ground-level ozone and particulate matter.

As you know, the Clean Air Act directs EPA to set national standards for certain air pollutants to protect public health and the environment. For each of these pollutants, Congress directed EPA to set what are known as "primary" standards to protect public health without consideration of cost. Under the Act, Congress directs EPA to review these standards every five years to determine whether the latest scientific research indicates a need to revise the standards.

In July of this year, I set new standards for ozone and particulate matter (PM) that will be a major step forward in public health and welfare protection. Each year, these updated standards have the potential to prevent as many as 15,000 premature deaths, and hundreds of thousands of cases of significantly decreased lung function in children and cases of aggravated asthma.

The new ozone and particulate matter standards are based on an extensive scientific and public review process. Congress directs EPA to consult with an independent scientific advisory board, the Clean Air Scientific Advisory Committee (CASAC). In conducting these reviews, EPA analyzed thousands of peer-reviewed

scientific studies that had been published in well-respected scientific journals. These studies were then synthesized, and along with a recommendation on whether the existing standards were adequately protective, presented to CASAC. After three-and-a-half years of work, 11 meetings totaling more than 125 hours of public discussion, and based on 250 of the most relevant studies, the CASAC panel concluded that EPA's air quality standards for ozone and particulate matter should be revised. CASAC unanimously supported changing the ozone standards from a 1-hour averaging period to an 8-hour average to reflect increasing concern over prolonged exposure to ozone, particularly in children. CASAC also supported adding a fine particle standard. Fine particles are inhaled deeply into the lungs and are more strongly associated with serious health effects and visibility impairment than larger particles.

Based on scientific evidence reviewed by EPA and CASAC, EPA proposed revised standards and conducted an extensive public comment process, receiving approximately 57,000 comments at public hearings across the country and through written, telephone and E-mail message communications.

After carefully considering the results of this extensive process, and with the support of the President, I issued a final rule updating the ozone standard from 0.12 parts per million (ppm) of ozone measured over one hour to a standard of 0.08 ppm measured over eight hours, with the three-year average of the annual fourth highest concentration determining whether an area is out of compliance. The new standard will reduce “flip-flopping” in and out of attainment by changing from an "expected exceedance" to a "concentration-based" form.

For particulate matter, EPA is adding new standards for particles smaller than 2.5 micrometers in diameter (known as "PM-2.5" or fine particles). The fine particle standard will have two components: an annual standard, set at 15 micrograms per cubic meter and a 24-hour standard, set at 65 micrograms per cubic meter. EPA has also changed the form of the current 24-hour PM-10 standard; this will provide some additional stability and flexibility to states in meeting that standard.

Our PM-2.5 rule requires three years of federal reference method air quality monitoring data for determining whether an area is "attainment" or "nonattainment" with the new PM-2.5 standards. To obtain these data, a comprehensive network of monitors must be put in place. EPA has agreed to cover the cost of establishing that network through grants to states. In view of the time needed to establish the network and collect data, EPA expects that three years of PM-2.5 monitoring data will not be available until between 2001 and 2004, depending on when monitors are installed in a given locality. Therefore, actual designations of attainment or nonattainment will not take place until between 2002 and 2005. If an area is designated nonattainment, a state will have up to three years to develop a plan to control the problem. Areas will have ample time to review and analyze the nature of their particulate matter problem and to develop technically sound and cost-effective control strategies. In addition, states that are participating in regional reduction programs to curb acid rain will not face new local requirements if full implementation of the acid rain program would enable attainment of the PM-2.5 standard.

As required by the Clean Air Act, EPA intends to complete its next periodic review of the particulate matter national ambient air quality standards, including review

by the Clean Air Scientific Advisory Committee, within five years of issuing these new standards. By July 2002, EPA will have determined, based on data available from its review, whether to revise or maintain the standards. This determination therefore will be made before any areas have been designated nonattainment under the PM-2.5 standards and before any new controls related to the PM-2.5 standards are implemented.

Effect on Agriculture of EPA's Revised Air Standards for Ground-level Ozone

Ozone causes damage to vegetation by interfering with the ability of plants to produce and store food, so that growth, reproduction and overall plant health are compromised. Plants and trees weakened in this way become more susceptible to disease, pests and environmental stresses.

Research at the U.S. Department of Agriculture (USDA), EPA and elsewhere has shown that ground-level ozone damages many kinds of trees and crops. Significant damage due to ground-level ozone has been seen in tree species such as black cherry, white pine, aspen and ponderosa pine. It also damages many kinds of crops such as soybeans, wheat, kidney beans, cotton and peanuts, resulting in significantly reduced crop yields. Ozone can cause visible injury to vegetation, affecting the aesthetic value, and therefore, the market value of leafy crops. Overall, EPA estimates that full compliance with the newly-revised ozone standard would result in more than $500 million in benefits to the American farmer.

The extensive scientific review of the ozone standard included a review of the effects of ozone on trees, crops, and other vegetation. The CASAC supplemented its

panel with experts in plant biology and economics to examine the impact of ozone on crops, trees and vegetation. In the April 4, 1996, closure letter to EPA on this matter, George Wolff, chairman of the CASAC wrote:

> "It should be pointed out that the Panel members all agreed that damage is occurring to vegetation and natural resources at concentrations below the present 1-hour national ambient air quality standard (NAAQS) of 0.12 ppm. The vegetation effects experts were in agreement that plants appear to be more sensitive to ozone than humans. Further, it was agreed that a secondary NAAQS, more stringent than the present primary standard, was necessary to protect vegetation from ozone...."

There are other benefits from controlling ozone. For example, reducing emissions of nitrogen oxides (NOx), one of the key components that causes ozone, also helps protect sensitive waterways and estuaries, like the Chesapeake Bay, Tampa Bay, and the Albemarle-Pamlico Sound. Airborne sources of nitrogen, including NOx, are responsible for an estimated 27 percent of the overall nitrogen loading to the Chesapeake Bay, contributing to fish kills and algal blooms. Emissions of NOx are responsible for 70 to 80 percent of this deposited nitrogen.

There are a number of other significant benefits from reducing adverse effects of ozone on vegetation, forests, and natural ecosystems. For example, specific benefits from ozone reductions in ambient concentrations would accrue from: decreased foliar injury; averted growth reduction of trees in natural forests; maintained integrity of forest ecosystems (including habitat for native animal species); and the aesthetics and utility of urban ornamentals (e.g., grass, flowers, shrubs and trees).

Effect on Agriculture of EPA's Revised Air Standards for Particulate Matter

Historically, EPA's standards for particulate matter have often tended to focus emission control efforts on "coarse" particles -- those larger than PM-2.5. Before 1987, EPA's particulate matter standards focused on "total suspended particles" -- including even larger-sized particles. In 1987, responding to new science showing that it was the smaller particles that are capable of depositing in the lungs that were associated with the most adverse health effects, EPA revised the standards to control only those particles smaller than 10 micrometers in diameter (or PM-10). For comparison purposes, a human hair is about 70 micrometers in diameter.

The most recent scientific review focused attention on the need to better address the "fine" fraction particles -- those smaller than 2.5 micrometers in diameter. CASAC recommended setting a fine particle standard. However, we continue to see adverse health effects from exposure to the "coarse" fraction (those between 2.5 and 10 micrometers in diameter) of PM at levels above the current standards. As a result, CASAC scientists agreed that existing PM-10 standards, with minor revisions, should be maintained for the purpose of continuing to control the effects of exposure to the "coarse" fraction of PM-10.

However, over twenty of the new health and atmospheric science studies have highlighted significant health concerns with regard to the smaller "fine" particles, or "fine" particle indicators. These particles are so small that several thousand of them could fit on the type-written period at the end of a sentence. In the simplest of terms, fine particles represent a health concern because they can remain in the air for long

periods, both indoors and outdoors, and can easily penetrate and be absorbed deep into the lungs. These fine particles are not only associated with serious health effects, but are also a major reason for visibility impairment in the United States in places such as national parks that are valued for their scenic views and recreational opportunities. For example, visibility in the eastern United States, which should naturally be about 90 miles, has been reduced to under 25 miles.

These fine particles get into the air in two ways. They are emitted directly into the air from a variety of sources such as diesel buses, utility and commercial boilers, woodburning, and construction activities. These are known as "primary" or direct emissions. Fine particles are also chemically formed in the air from sulfur or nitrogen gases emitted from sources such as power plants, motor vehicles, or fuel combustion and can be transported many hundreds of miles. These are known as "secondary emissions."

Based on our analysis to date, we believe that "secondary" particulate matter -- sulfates and nitrates formed from nitrogen oxides and sulfur dioxide gas emissions from power plants, for example -- generally represents the largest percentage of PM-2.5 in the air. Since secondary PM-2.5 is formed in the atmosphere and often transported much greater distances than "coarse" particles, EPA and states will need to assess regional, rather than local-only, emission control strategies to reduce PM-2.5.

Some have alleged that EPA's new PM-2.5 standard means EPA and the states will focus on regulating agricultural tilling. This is not true. EPA does not intend to focus on regulating agricultural tilling to control PM-2.5 and does not believe it would be efficient for states to do so. First, soil particles are a very small part of the PM-2.5

problem. Combustion particles are almost always smaller than 2.5 micrometers and soil particles are almost always larger than 2.5 micrometers. In addition, the "release height" of a pollutant has an impact on how widespread an air pollution problem can be. Combustion particles as well as the gases that form sulfates and nitrates from power plants, for example, are released higher into the air than are soil particles from tilling. These combustion products can travel hundreds of miles, affect air quality over broad regions, and affect populated areas, whereas soil particles tend to settle back out of the atmosphere near to their sources.

In order to better characterize the types of emission sources potentially contributing to the PM-2.5 air quality problem, EPA has analyzed PM-2.5 filter samples from areas where such data are available. This kind of analysis is helpful in determining, for example, the extent to which agricultural tilling is a significant source of PM-2.5. We have found that even in a heavily agricultural area such as the San Joaquin Valley in California, agricultural wind erosion and tilling account for less than 6 percent of the total PM-2.5 being measured. The bulk of emissions come from motor vehicles and stationary combustion sources.

In the eastern United States, sulfates formed from the sulfur emissions of coal-fired power plants and other boilers represent roughly half of the entire PM-2.5 problem. In Washington D.C., for example, soil particles represent only five percent of the total PM-2.5 problem. And all of that five percent is estimated to come from construction activity and road dust, not agricultural sources.

This same pattern can be seen in other rural and agricultural areas that EPA has analyzed, where soil is a very small component of overall PM-2.5 levels. With the

exception of a very few areas that have a mix of agricultural, mobile, and industrial sources, there is little evidence that levels of PM-2.5 in agricultural areas would exceed the new standards. For example, air quality data for Wichita and Topeka, Kansas; Clint, Texas; Portage, Wisconsin; Bismarck, North Dakota; and several rural National Parks, such as the Badlands National Park in western South Dakota, all show levels of PM-2.5 well below EPA's newly-promulgated annual standard.

For these reasons, and as I indicated in my June 5, 1997 letter to the Secretary of Agriculture, Dan Glickman, I intend to issue guidance to the states so that in planning to meet the new PM-2.5 standard, they focus their control strategies on fine, rather than coarse particles. Moreover, EPA will not focus regulatory efforts to meet the PM-2.5 standard on farm tilling activities. EPA will work with states to help determine sources of PM-2.5 pollution and to develop appropriate regulatory strategies, including regional strategies, to address PM-2.5 problems.

Moreover, in our final rule, we are directing states to target PM-2.5 monitors in urban areas with large populations where PM-2.5 health effects are likely to occur, not in agricultural areas. Monitors will provide data with sufficient speciation to identify which sources are contributing to PM-2.5 levels (e.g., combustion devices, smelters, industrial plants or agricultural tilling).

With regard to prescribed burning on federal lands and open burning on agricultural lands, EPA recognizes the role of fire in forest ecosystems and on agricultural lands, and will continue to work with USDA’s Forest Service and the Natural Resources Conservation Service to develop air quality strategies that accommodate appropriate uses of burning.

We are also continuing to work closely with the USDA on their Agriculture Air Quality Task Force and this Committee to share information and confer on matters of mutual importance regarding air issues and agriculture. We intend to take into consideration recommendations made by the Task Force on agriculture-related issues. To date, the Task Force has unanimously endorsed a list of high priority research needs to improve the level of understanding of agriculture's impact on air quality levels. We have agreed through this Task Force that additional research is needed on particulate matter to better understand windblown dust, agricultural burning, field operations, and nonroad engine emissions for example. For ozone, we have agreed that additional research is needed in order to fully estimate the economic consequences of ozone pollution on crop yields, and to better characterize the ozone pollution problems in non-urban areas.

Another major activity under development by the Task Force is a Memorandum of Understanding (MOU) between USDA and EPA that establishes a framework to share expertise and a process for involving the agricultural community in a cooperative effort to address agriculture-related air quality issues. The MOU has been drafted and is undergoing review by USDA and EPA.

Conclusions

In summary, the best available science indicates that crops and vegetation will benefit from programs designed to meet the new air quality standards for ground-level ozone. For particulate matter, despite misconceptions, EPA expects that agricultural sources will turn out to be a very small part of the overall PM-2.5 problem. The major sources of PM-2.5 are sulfates from power plants (particularly in the eastern United

States), and soot emissions from inefficient combustion in boilers, mobile sources and woodburning. EPA's goal is for states to locate PM-2.5 air quality monitors in highly populated areas and other areas likely to have a PM-2.5 problem. To address the PM-2.5 problem, we do not intend to target agricultural areas for fugitive dust-related emissions, such as those associated with agricultural tilling. And we are committed to working closely with Secretary Glickman, his Department, and the USDA Agricultural Air Quality Task Force on agriculture-related matters associated with the new air quality standards.

Mr. Chairman, this concludes my written statement. I will be happy to answer any questions that you may have.