

Implications for Agriculture of the Proposed Revisions to the National Ambient Air Quality Standards for Coarse Particulate

USDA Agricultural Air Quality Task Force Panel on Coarse Particulate

Section 109 of the Clean Air Act requires the Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQS) and to review them, and revise them, as appropriate, every 5 years. Primary NAAQS must be set at the level that is “requisite to protect the public health,” allowing an adequate margin of safety; secondary NAAQS must be set at the level “requisite to protect the public welfare from only known or anticipated adverse effects associated with the presence of (a listed) air pollutant in the ambient air.” According to the U.S. Supreme Court in the Clean Air Act, “requisite” means a level that is “not lower or higher than necessary.”

In 2004, EPA staff prepared a Particulate Matter (PM) staff paper (SP) that proposed changes to the NAAQS for PM_{2.5} and recommended a new coarse PM standard with the indicator being PM_{10-2.5}. A Second Draft PM SP was made available for review on January 31, 2005. This SP was reviewed (April 6-7, 2005 & May 18, 2005) by the Clean Air Scientific Advisory Committee (CASAC) and has received substantial comment from stakeholder groups including mining, construction, and agriculture. Promulgation of a new PM_{10-2.5} standard (coarse PM) will have significant, far-reaching implications for both animal and production agriculture because, “...the SP, in its present form, does not represent a balanced and scientifically adequate synthesis and interpretation of the scientific evidence.” (Dr. Roger O. McClellan, Member of CASAC, April 23, 2005 revised comments on SP, p. B-51)

We concur with the EPA SP that the substantial uncertainties associated with the limited body of evidence on health effects related to exposure to PM_{10-2.5} suggests a high degree of caution in interpreting the evidence at the lower levels of air quality observed in the studies discussed in the SP (SP p. 5-59, line 20). Moreover, there is a high degree of uncertainty, based on the available studies, that there would be any public health benefit from the promulgation of a coarse PM standard (SP p. 5-75, line 12). “In addition, little is known about coarse particle composition, and less about the health effects associated with individual components or sources of thoracic coarse particles, but it is possible that there are components of thoracic coarse particles (e.g., crustal material) that are less likely to have adverse effects, at least at lower concentrations, than other components.” (SP p. 5-76, line 22)

The EPA staff intends to finalize the SP by June 30, 2005. The EPA Administrator is required by court order to have signed a proposal with EPA’s decisions on PM NAAQS by December 20, 2005. To meet these deadlines, a draft proposal would be sent to OMB by early September. It is critical that agriculture’s concerns be addressed in this pending action by EPA. Because of the uncertainty of the science to support a new PM_{10-2.5} standard and the potential serious

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consequences to agriculture, a panel of the USDA Agricultural Air Quality Task Force were assembled May 26-27, 2005 to recommend a response by Secretary Mike Johanns to EPA Administrator Stephen L. Johnson.

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EPA staff has recently recommended a 65-85 $\mu\text{g}/\text{m}^3$ NAAQS for $\text{PM}_{10-2.5}$, intended to be equivalent to the PM_{10} short-term NAAQS of 150 $\mu\text{g}/\text{m}^3$ (24-hr standard) (SP p. 5-69, line 1). However, CASAC has recognized that the wide regional and source-specific variations in the fine/coarse ratio of PM emissions make it very difficult if not impossible to adopt any single $\text{PM}_{10-2.5}$ standard as a nationwide equivalent standard. The proposed 65-85 $\mu\text{g}/\text{m}^3$ NAAQS for $\text{PM}_{10-2.5}$ is not equivalent to the current PM_{10} standard in agricultural settings where emissions are dominated by the coarse mode. (Using a typical log-normally distributed dust from an agricultural source with a mass-median diameter of 20 microns and a geometric standard deviation of 2.0, the equivalent coarse standard would be 149 $\mu\text{g}/\text{m}^3$.) Given a $\text{PM}_{10-2.5}$ NAAQS of 65-85 $\mu\text{g}/\text{m}^3$, an area dominated by coarse PM could have concentrations below the current PM_{10} and $\text{PM}_{2.5}$ NAAQS and yet exceed the $\text{PM}_{10-2.5}$ NAAQS proposed in the SP.

Even though EPA is proposing a new $\text{PM}_{10-2.5}$ standard, there is no existing FRM for measuring $\text{PM}_{10-2.5}$ nor a nationwide monitoring network for $\text{PM}_{10-2.5}$. At the current time, $\text{PM}_{10-2.5}$ concentrations subject to the proposed NAAQS are estimated by subtracting $\text{PM}_{2.5}$ concentrations from PM_{10} concentrations. The available science indicates that the “difference method” of measuring coarse PM is not accurate, as a subcommittee of CASAC has recognized. Subtracting two measured and biased concentrations from each other will not produce accurate $\text{PM}_{10-2.5}$ concentrations. In a typical case involving agricultural emissions, systematic biases compounded by the subtraction method can yield large measurement errors (in excess of 1000 percent) if the sampler operates within the $\text{PM}_{2.5}$ and PM_{10} FRM performance criteria. This procedure is technically incorrect and does not yield accurate concentrations of $\text{PM}_{10-2.5}$.

A coarse PM standard is not warranted based on current knowledge. “The selection of a $\text{PM}_{10-2.5}$ indicator is without scientific merit and would represent an arbitrary and capricious choice based solely on the perceived need to have a “place holder” coarse PM indicator.” (Dr. Roger O. McClellan, Member of CASAC, April 23, 2005 revised comments on SP, p. B-51.) The final PM CD (Oct 2004), EPA Staff, the CASAC, and numerous public comments, acknowledge that coarse PM health data are seriously limited. The final PM CD contains no conclusions as to the fitness of the short-term data for standard-setting purposes but repeatedly emphasizes their weakness as well as citing studies of exposure to coarse PM which have shown no evidence of harm. “Staff recognizes, however, that the epidemiologic evidence on morbidity and mortality effects related to $\text{PM}_{10-2.5}$ exposure is very limited at this time.” (SP p. 5-73, line 8) The SP concludes that there is substantial uncertainty supporting the concentration-response effect upon adverse human health based on non-representative study sites. This is secondary to an underestimation of $\text{PM}_{10-2.5}$ concentrations at the distant recording sites and that $\text{PM}_{2.5}$ is the

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predominate fraction of the ambient PM and not representative of areas with higher levels of thoracic coarse particles. (SP p. 5-59, line 17-19; p. 5-68, lines 1-16)

THE MAJOR RECOMMENDATION

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Recommendation: The USDA Agricultural Air Quality Task Force recommends that a coarse PM NAAQS not be promulgated unless and until sufficient research findings justify a standard.

OTHER SIGNIFICANT RECOMMENDATIONS

In addition to our concerns on the current and proposed PM NAAQS, there are other significant scientific deficiencies related to particulate monitoring in agricultural areas. They are:

1. PM_{2.5} and PM₁₀ concentrations measured with FRM samplers are biased when sampling PM with mass median diameters (MMD) larger than 2.5 and 10 microns respectively. Errors due to sampler bias of a magnitude of 20:1 are encountered when using FRM PM_{2.5} samplers to measure PM_{2.5} emissions (Buser et al., 2003). The subsequent use of these biased data will overestimate emissions and ambient concentrations. This will result in more agricultural areas being classified erroneously as non-attainment. In non-attainment areas, all sources of PM_{2.5}, including agricultural operations, will be required to reduce their respective PM_{2.5} contributions to the ambient air.

Recommendation: The USDA Agricultural Air Quality Task Force recommends that EPA address the sampler bias issues associated with ambient concentration measurements using FRM samplers.

2. The purpose of a NAAQS, as defined in the Clean Air Act, is to protect the health and welfare of the public. Agricultural operations are typically located appreciable distances from residential and recreational centers such that the property line emissions from these sources do not accurately reflect the quality of the ambient air to which the public is exposed. Furthermore, "Guidance for Network Design and Optimum Site Exposure for PM_{2.5} and PM₁₀", guidance prepared for EPA (Dec. 15, 1997) that "represents EPA's current views on these issues", specifies that FRM samplers located at a property line are not to be used to determine the attainment status of an area. Samplers used to determine compliance with the NAAQS are to be sited such that they are not affected by any one source.

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Recommendation: The USDA Agricultural Air Quality Task Force recommends that the NAAQS should not be used as a “concentration not to be exceeded” at the property line for permitting and enforcement of PM emissions from agricultural sources.

CONCLUSION

In conclusion, the NAAQS are health-based standards and agriculture is committed to protecting the health of our families, workers, and community by complying with standards that are requisite and necessary. However, this Panel is concerned that a coarse PM standard might be issued in the absence of sound science and would result in ineffective, unfair, and unnecessary controls. This panel has carefully reviewed the relevant EPA documents as well

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as the CASAC review and we strongly recommend that the proposed PM_{10-2.5} standard not be promulgated unless and until sufficient research findings justify a standard.

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