Air Quality

Odor, Dust and Gaseous Emissions

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Texas Agricultural Experiment Station
THE TEXAS A&M UNIVERSITY SYSTEM

**Center for Agricultural Air Quality Engineering & Science**

# THE PM COARSE ($PM_{10-2.5}$) ISSUE

## FACT SHEET

**Potential Problems of $PM_{10-2.5}$**

There are several problems with superimposing a new PM coarse ($PM_{10-2.5}$) standard on top of existing $PM_{10}$ and PM $_{2.5}$ standards.

First, establishing the standard on the basis of the difference in the current PM standards implies the assumption all particulate matter can be described by a common particle size distribution (PSD). Most particle size distributions can be described by a lognormal distribution relating percent mass to particle diameter. The defining parameters of the lognormal distribution are the mass median diameter (MMD) and the geometric standard deviation (GSD).

The MMD is the particle diameter where 50 percent of the particulate mass is greater in diameter and 50 percent is less than in diameter. The GSD defines how tight or spread-out the distribution is (i.e. variability) for a given dust. Most rural dusts have a much larger MMD, typically in the range of 15 to 25 µm. Thus rural operations typically have much larger particle size distributions than urban sources.

The new proposed coarse standard shows a lack of understanding of the difference between particle size distributions in urban versus rural environments.

Wanjura (2005) showed setting the $PM_{10-2.5}$ standard at 75 $\mu g/m^3$ and applying the measured ratios of $PM_{10}/PM_{10-2.5}$ and $PM_{2.5}/PM_{10-2.5}$ effectively lowers existing $PM_{10}$ and $PM_{2.5}$ standards.

In response to industry concerns, an exemption for rural sources has been proposed. History has shown agricultural/rural exemptions from air quality regulations are short lived. For example, California was forced (by EPA) to remove agricultural exemptions from air quality regulations for the state implementation plan to be approved.

A second problem with applying a $PM_{10-2.5}$ standard is no federal reference method sampler exists to measure $PM_{10-2.5}$. EPA has given four potential types of methods for evaluating $PM_{10-2.5}$.

1. Subtraction method, where $PM_{10}$ and $PM_{2.5}$ are measured and the difference between the two is said to be $PM_{10-2.5}$.
2. Dichotomous sampler that separates the PM into $PM_{2.5}$ and $PM_{10-2.5}$ fractions.
3. Continuous method (e.g. TEOM), using an impactor to separate $PM_{10-2.5}$ fraction.
4. Particle counter for $PM_{10-2.5}$ fraction.

Third, some states have applied the NAAQS as a property line concentration limit in an effort to ensure air quality compliance with federal standards (Shaw et al, 2004). Implementing the $PM_{10-2.5}$ standard as a property line standard could force many agricultural production or processing industries to install additional air pollution control equipment. Installing such controls could be extremely costly and jeopardize the financial stability of the facilities.

**Research and Policy Issues**

Several key scientific and economic issues must be addressed before a $PM_{10-2.5}$ standard is implemented including:

- More research on the relationship between adverse health effects and $PM_{10-2.5}$ concentrations;
- The development of a federal reference method sampler to measure $PM_{10-2.5}$; and
- Economic analysis of the impact of the implementation of a $PM_{10-2.5}$ standard on U.S. industries and communities.

In order to appropriately regulate air quality, standards must be developed such that 1) public health is protected, and 2) all industries are regulated equitably. Efforts to exempt rural sources from the proposed $PM_{10-2.5}$ standard may prove to be a quick-fix to the problem for rural sources. The longevity of this approach is debatable.

**References:**


Wanjura, J.D. 2005. "Appendix H: Basis for Regulating Agricultural Operations Based on PM Coarse ($PM_C$)." Master of Science Thesis. Department of Agricultural Engineering, Texas A&M University. College Station, TX.

Shaw, B.; R. Lacey; S. Capareda; M. Buser; C.B. Parnell; J. Wanjura; L. Wang; and W. Faulkner. 2004. "Application of the National Ambient Air Quality Standards (NAAQS) in Urban Versus Rural Environments." Paper presented at the 2004 ASAE/CSAE Annual International Meeting held from August 1-4, 2004 at Ottawa, Ontario, Canada. Paper No. 044016.