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The National Cattlemen's Beef Association ("NCBA") submits the following comments on EPA's proposed rule to implement the fine particle ("PM2.5") National Ambient Air Quality Standards ("NAAQS") under the Clean Air Act. 70 Fed. Reg. 65984 (November 1, 2005. Our comments will address three issues of critical importance to the cattle industry. The first is EPA's proposal to regulate crustal material under the fine PM standard. Because of the devastating impact such regulation would have on the cattle industry, the lack of substantial health effects associated with crustal PM, and the fact that the distinction between the chemistry, source and formation of fine and coarse particles has historically been a fundamental one, we urge the EPA to adopt a mechanism in the implementation rule to exclude crustal material from regulation under the fine PM NAAQS. The second issue NCBA will address is the inappropriateness of regulating ammonia as a precursor to the formation of fine PM at this time. Given the uncertainties in emissions data, the dispersed nature of ammonia sources and the lack of present controls, it is premature to consider such regulation. The third issue is the similarly inappropriate proposed regulation of VOCs as precursors to the formation of fine PM. Not all VOCs are the same. NCBA urges the EPA to study any possible VOCs emitted from cattle operations to determine their reactivity prior to requiring the adoption of as yet unknown control measures.

NCBA is the national trade association representing U.S. cattle producers, with more than 25,000 individual members and sixty-four state affiliate, breed and industry organization members. Together NCBA represents more than 230,000 cattle breeders, producers and feeders, and is the marketing organization for the largest segment of the nation's food and fiber industry.

NCBA members are responsible environmental stewards who love and respect the land, air and water that are fundamental to sustaining our way of life. We recognize an environmental stewardship code and have adopted policy that states that the Association "shall not be compelled to defend anyone in the beef cattle industry who has clearly acted to abuse grazing, water or air resources." "2005 Policy," National Cattlemen's Beef Association, Property Rights and Environmental Policy 1.1. Cattle producers will continue to work every day to protect and improve the environment so that they and future generations will be able to continue to live off the land.

The ability of cattlemen to continue to operate economically viable operations, however, depends on the EPA's willingness to refrain from imposing unnecessary and inappropriate regulations on them. Three such potential regulations are EPA's proposals to regulate crustal material under the fine PM NAAQS, and ammonia and VOCs as precursors to the formation of fine PM. NCBA urges the EPA to refrain from imposing these proposed regulations on cattle operations.

I. Proposed Regulation of Crustal Material under the Fine PM NAAQS

A. Cattle Operations and Particulate Matter.

The dust produced by cattle pasturing and feeding operations in open pastures and feedlots is, by its scientific definition and characteristics, coarse PM. It is earthen and solid materials, including dried manure, that becomes airborne by virtue of the action of cattle hooves, wind, and other physical forces that divide it and cause it to be become airborne. That manure in feedlots is periodically removed and applied to croplands, or composted to become fertilizer. These comments address the treatment of this particulate matter under the fine PM implementation rule.

B. Consequences of Proposed Rule to NCBA Membership.

In its Proposed Rule to implement the Fine Particle National Ambient Air Quality Standards, EPA has, for the first time to our knowledge, begun treating crustal and other coarse PM as fine PM if it is below $PM_{2.5}$, even in cases where coarse PM dominates the PM being sampled, as is the case with feedlots in Arizona. (See discussion and reference below of PM2.5 measurements from feedlots in Pinal County, Arizona, where such ambient feedlot dust was measured at 79.8% of PM2.5 24-hour concentrations of more than 183 μg/m3; soils added another 16.2 %, for a total of 96% coarse PM being measured as PM2.5. See Pinal County Study at p. 64.). During four other 24 hour periods feedlot dust and soils ranged from 72.2 % to 82.7% of the PM2.5 measurements, all of which exceeded the proposed 24 hour PM2.5 standard of 35 μg/m3. *Id.*) As recounted below in more detail, historically EPA has acknowledged that coarse PM might "intrude" below PM2.5, down to approximately PM1, and that PM1 has been thought by many public and private scientists to be a better indicator of PM fine than PM2.5. EPA determined to set the PM fine indicator at PM2.5 because of reservations about the ability to measure PM1, and in order to capture the mass of fine particles in the accumulation mode in foggy, high-humidity events, recognizing that a small amount of coarse PM might also be collected. The possibility that PM2.5 might be made up of 80% or more of coarse particles was not anticipated. NCBA suggests that this development should now be addressed in implementation of the existing PM2.5 standard, as well as any revisions made to the PM2.5 standard. Specifically, NCBA believe that EPA should provide for the exclusion of the coarse PM intruding into the fine fraction. A specific method for doing so is suggested below.

The treatment of coarse PM, including crustal material, as fine PM2.5 will result in fine PM nonattainment from not only feedlot operations, but most certainly from other

comparable coarse fugitive dusts, such as those from agriculture, mining and unpaved roads, especially in rural communities in the arid, western United States long-considered by EPA and the air pollution control community to have no adverse health effects at ambient levels, but nonetheless subject to control on nuisance and local visibility grounds. Classifying such ordinary coarse, fugitive dusts as fine PM2.5 will treat them as equivalent to tobacco smoke and other combustion PM. In *American Trucking Ass'n v. EPA*, 175 F.3d 1027, 1053-55 (D.C. Cir. 1999), *aff'd in part and rev'd in part, sub nom. Whitman v. Am. Trucking Ass'n*, 531 U.S. 457 (2001), the D.C.Circuit Court of Appeals vacated the PM_{10} indicator for this very reason, namely that it included both fine and coarse PM, making it impossible to determine whether coarse or fine PM was responsible for the health or other damage that NAAQS are intended to protect the public from, and confounding the material sampled, as well as the ability to identify and to control sources.

II. EPA's Proposed Rule to Implement Fine PM NAAQS Includes Crustal and Other Coarse PM Dusts That Should Be Excluded from PM2.5.

A. Background

It has long been recognized that particulate matter falls into a "bi-modal" distribution of coarse particulate matter ("coarse PM") and fine particulate matter ("fine PM"). Fine PM generally has a particle diameter less than 1 μm, while coarse PM typically has a particle diameter greater than 3 μm. However, there is some overlap between fine and coarse PM in the "intermodal" range from about 1 to 3 μm.

Fine and coarse PM vary not only in particle size, but also in chemistry, source and formation:

> The distinction between 'fine particles' and 'coarse particles' is a fundamental one. There is now an overwhelming amount of evidence that not only are two modes in the mass or volume distribution usually observed, but that these fine and coarse modes are usually chemically quite different.

CD (2004) at 2-7 (quoting Whitby (1978)). Thus, while "[m]odes are defined primarily in terms of their formation mechanisms," they "also differ in sources, composition, transport and fate, as well as size." CD (2004) at 2-14. Fine particles are formed primarily by combustion or chemical reactions of gases, and composed of metals and metal oxides, black or elemental carbon, primary and secondary organic compounds, and sulfate, nitrate, ammonium and hydrogen ions. CD (2004) at 2-15. In contrast, coarse particles are formed by the mechanical breakdown of minerals, crustal material and organic debris. *Id.* (See also EPA 1996 PM Criteria Document: "Coarse particles are generated by mechanical processes and consist of soil dust, fly ash, sea spray, plant fragments, particles from tire wear, and emissions from rock-crushing operations. These particles are removed primarily by impaction and settling." (p. 3-6).

Within the intermodal range, the chemical composition of individual particles can usually (though not always) be used to identify the source or formation mechanism, and thereby identify a particle as fine PM or coarse PM. *See* CD (2004) at 2-15. Nonetheless, in 1997 EPA adopted the $PM_{2.5}$ standard, a purely size-based criterion, for separating fine and coarse particles. $PM_{2.5}$ particle size is defined by "size-selective sampling." In other words, the standard refers to particles collected by a sampling device which collects 50% of particles with a diameter of 2.5 μm, and rejects 50% of such particles. CD (2004) at 2-17. (The device must also accept or reject specified percentages of other diameter particles, as specified in federal regulations. *Id.*)

Although compelling arguments—including some from EPA's own scientists—supported selecting 1 μm as the "cut point" or "indicator" for fine PM, EPA chose to use the $PM_{2.5}$ standard, recognizing that it is over-inclusive of coarse PM. Among the considerations that led EPA to choose the 2.5 μm cut point was the fact that limited data on the concentration and composition of intermodal PM mass was available. CD (2004) at 2-25.

B. EPA Should Adopt a Mechanism In Its Proposed PM Fine Implementation Rule For Exclusion of Coarse PM Before Making Nonattainment Determinations.

EPA's Proposed Rule to Implement the Fine Particle National Ambient Air Quality Standards, 70 FR 65984 (Nov. 1, 2005) ("Proposed Implementation Rule"), describes requirements that States and Tribes must meet in their implementation plans for attainment of the $PM_{2.5}$ national ambient air quality standards ("NAAQS"). The Proposed Implementation Rule recognizes that despite overlap in the intermodal particle sizes, fine and coarse PM are generally associated with distinctly different sources and formation processes. 70 FR 65922. Despite this recognition, the Proposed Implementation Rule lists a broad range of constituents for fine particles, including "Sulfate (SO_4); nitrate (NO_3); ammonium; elemental carbon; a great variety of organic compounds; and inorganic material (**including** metals, **dust**, sea salt, and other trace elements) generally referred to as "crustal" material, although it may contain material from other sources." 70 FR 65988. (Emphasis added.) It seems clear that EPA is proposing to treat coarse PM dusts such as crustal material as fine PM, and to include it deliberately in fine PM implementation, thus treating it as equivalent to fine PM. We respectfully submit that such inclusion will undermine and confound the PM fine standard by including coarse PM that is without substantial health or welfare effects, and will likewise misdirect control efforts. NCBA urges EPA to provide a mechanism for excluding coarse PM from fine PM2.5 before making PM2.5 nonattainment designations.

Without such a refinement, the $PM_{2.5}$ indicator is likely to impose significant burdens on rural communities, particularly those in the arid western United States that are home to agricultural and mining activities. The Proposed Implementation Rule anticipates most non-attainment areas will be located in the eastern United States and California, and therefore focuses on those regions. 70 FR 65993. In doing so, it disregards the consequences for agricultural activities, including feedlots and ranching, if

western and rural communities are determined to be in nonattainment of the $PM_{2.5}$ NAAQS, as a result of the coarse PM contribution captured by the $PM_{2.5}$ indicator. (See Pinal County, Arizona study summarized below.)

Table 2 in the Proposed Implementation Rule, 70 FR 65993, shows differences in the composition of $PM_{2.5}$ between urban and rural areas, as well as across various regions of the United States. Notably, crustal material consistently comprises a larger component of $PM_{2.5}$ in rural areas, and in the Desert West, South, East Texas and Northern Plains. Because the mechanical processes associated with coarse PM formation rarely produce particles with diameter less than 1 μm, it is likely that these elevated levels of crustal material in fact represent coarse particles in the intermodal range, which are captured by the over-inclusive $PM_{2.5}$ indicator.

Shortcomings of applying the $PM_{2.5}$ indicator without further refinement through the Proposed Implementation Rule are further illuminated by considering EPA's Proposed Rule on National Ambient Air Quality Standards for Particulate Matter, 71 FR 2620 (Jan. 17, 2006) ("Proposed PM NAAQS Rule"). The Proposed PM NAAQS Rule concedes that "within the intermodal range of 1 to 3 μm there is no unambiguous definition of an appropriate size cut for the separation of the overlapping fine and coarse particle modes." 71 FR 2645. Once again, however, it is asserted that certain policy considerations support the selection of the $PM_{2.5}$. In particular, a regulatory determination that it is more important to capture fine particles more completely under a range of conditions and across the United States, than to avoid coarse-mode intrusion into the fine fraction in some areas. *Id.*

Several flawed assumptions underlie this reasoning. First, it posits a false dilemma that the fine PM definition must be either under-inclusive of the fine mode or over-inclusive of the coarse mode. EPA has an opportunity in the Proposed Implementation Rule to retain the $PM_{2.5}$ indicator, while supplementing it with a mechanism to eliminate coarse PM prior to making nonattainment determinations.

At the time the $PM_{2.5}$ indicator was adopted in 1997, little information on the composition of intermodal mass was available, but it was assumed that there was only a small amount of coarse PM intrusion that would be captured in the fine PM measurements. *See, e.g.*, CD (2004) at 2-25, 71 FR 2644. However, more recent information establishes that is such is not the case. The Proposed PM NAAQS Rule recognizes that while there is generally little mass in the intermodal range, in certain circumstances, such as dry, dusty areas, there will be increased coarse intrusion into the intermodal range. 71 FR 2645. This increased coarse PM mass in the intermodal range will be captured by the $PM_{2.5}$ indicator, and without further refinement of the indicator or provision for exclusions from it in implementation, will lead to nonattainment determinations—particularly in western and rural communities—on the basis of coarse PM, which has never been demonstrated to be harmful at ambient concentrations.

The problem is vividly illustrated by the results of an EPA-funded study conducted in Pinal County, Arizona, published in July 2005, "Pinal County Air Quality

Control District Source Apportionment Study" Prepared by Pinal County Air Quality Staff (July 29,2005)("Pinal County Study" hereafter, attached as Exhibit A). The Pinal County Air Quality Control District conducted a source apportionment study to identify sources of elevated particulate matter in an agricultural basin in the heart of the Sonoran Desert, typifying the sort of arid western rural areas that will face the most severe consequences if agricultural or mining activities must be curtailed due to $PM_{2.5}$ nonattainment resulting from high levels of crustal coarse PM intrusion. The study gathered data at a range of sites including downtown and residential locations, as well as areas surrounded by agricultural uses, feedlots and desert environments.

At four of the five locations, geologic soil[1] was, on average, the largest contributor to the $PM_{2.5}$ mass, comprising between 40 and 50%. Pinal County Study at pp. 29, 32, 37 and 40. At the location nearest the feedlot, soil chemically identified as being from the feedlot represented 49% of the average and geologic soil another 24%. *Id.* at 34. These findings suggest that without an implementation mechanism that isolates crustal and other coarse PM material from fine PM, rural communities engaged in agriculture and mining will, like feedlots, almost certainly face significant nonattainment problems under the $PM_{2.5}$ standard. Indeed, the Pinal County Study included one sample from the feedlot site where the measured $PM_{2.5}$ contained 79.8% feedlot dust and 16.2% soil dust, for a total of 96% coarse PM, and the concentration was 183.3 $\mu g/m^3$ – nearly three time the existing primary, 24-hour health standard for fine PM, and more than 5 times the proposed 24-hour primary, health standard for PM2.5, namely 35 μg/m3. Pinal County Study at p. 64. During a single month, the Pinal County study measured PM2.5 above the proposed PM2.5 standard on six days when coarse PM exceeded 68.2% of the fine PM2.5, and averaged 78.3% of the PM2.5. *Id.*

The Proposed PM NAAQS Rule also provisionally concludes that current studies do not provide a sufficient basis for eliminating any individual component from the fine PM standard. At the same time, however, the Proposed PM NAAQS Rule establishes a new indicator for thoracic coarse particles $PM_{10-2.5}$, which excludes any ambient mix of $PM_{10-2.5}$ that is dominated by rural windblown dust and soils and PM generated by agricultural and mining sources. 71 FR 2627. The Proposed PM NAAQS Rule also notes in its discussion of $PM_{10-2.5}$ that certain classes of ambient particles, such as particles of crustal origin, "are relatively non-toxic under most circumstances, compared to combustion related particles," 71 FR 2666 (citing 2004 CD), and that in light of limited evidence, "it is not appropriate to generalize the available evidence of associations with health effects that have been related to thoracic coarse particles generally found in urban areas and apply it to the mix of particles typically found in non-urban or rural areas." 71 FR 2667 (citing 2005 Staff Paper). Thus, given the lack of substantial health or welfare effects from crustal and other coarse PM, and PM found in rural areas, an exception similar to that provided for rural soils and dust generated by agricultural and mining sources under the $PM_{10-2.5}$ standard is likewise appropriate to eliminate coarse intrusion under the $PM_{2.5}$ indicator.

[1] The study was unable to distinguish between soil from unpaved roads and from agricultural activities, and combined these two sources in the "geologic soil" category. In contrast, soil from feedlots had distinctive chemical markers.

EPA has an opportunity in the Proposed Implementation Rule to retain the $PM_{2.5}$ indicator, while supplementing it with a mechanism to eliminate coarse PM prior to making nonattainment determinations. Dr. Dale A. Lundgren developed one such methodology for excluding coarse particle intrusion from $PM_{2.5}$ measurements in 1996. Dr. Lundgren's technique, described more fully in the comments and papers attached hereto as Exhibit B, provides a specific, practical methodology to estimate intrusion of coarse PM into the $PM_{2.5}$ region using only a PM_{10} and $PM_{2.5}$ measurements. Dr. Lundgren has previously proposed that this procedure be incorporated into EPA regulations in order to overcome the cross-contamination and distortion that otherwise occurs when $PM_{2.5}$ is used as the indicator for fine PM. (See March 12, 1997 Comments of the National Mining Association on Proposed Changes to Federal Reference Method for $PM_{2.5}$, included in the materials in Exhibit B.)

III. Possible Regulation of Ammonia as a Fine PM Precursor

Ammonia is emitted from many sources including livestock, fertilizer, domestic animals, wild animals, wildfires, soil, industry, mobile sources, humans, and publicly owned treatment works. For each of these source categories there are large uncertainties in the magnitude of emissions, the diurnal and seasonal variation, and the spatial distribution. Chitjian, Mark, "An Improved Ammonia Inventory for the WRAP Domain Literature Review", (October 31, 2003), p. 1. Uncertainty in the ammonia emissions is the key source of uncertainty in the formation of sulfate and nitrate aerosols. *Id.* These uncertainties must be addressed before consideration of a regulatory framework for ammonia may be appropriate.

The nitrogen in animal manure and urea can be converted to ammonia through a series of biological processes. There is, however, no comprehensive, sound, science-based set of data on animal emissions. Part of the reason such a database does not exist for animal feeding operations is the great variability in emission rates which can vary ten-fold or more during periods as short as an hour or as long as a year with changes in the management of the animals, their age, feed, housing type, nutritional management systems, waste handling methods, application techniques, type of crops upon which wastes are applied, and weather conditions, among others. "Air Emissions from Animal Feeding Operations: Current Knowledge, Future Needs (NAS 2003), p. 241. Recent chemical transport modeling suggests that daily and hourly variability in ammonia emissions is required to model accurately the formation of ammonia nitrate and ammonium sulfate. G.E. Mansell, "An Improved Process Based Ammonia Emission Model for Agricultural Sources: Emission Estimates," Environ International Corporation. In addition, there is a general paucity of credible scientific information on the effects of mitigation technology on concentrations, rates and fates of air emissions from these operations. NAS, p. 72. There is currently a great deal of research being conducted at universities and elsewhere designed to develop credible emissions factors, as well as technically and economically feasible methods for decreasing such emissions. NCBA supports these efforts.

NCBA agrees with the EPA's determination in the Clean Air Interstate Rule, promulgated in May 2005, that the appropriate mechanisms for cutting back on secondary formation of PM2.5 is to decrease SO2 and NOx emissions, instead of ammonia emissions. NCBA submits that nothing has changed with regard to the appropriateness of ammonia regulation since that time, and urges EPA to regulate SO2 and NOx, instead of ammonia, under the fine PM NAAQS for the reasons set forth in the Preamble to the CAIR where the EPA generally ruled out ammonia regulation:

> While current models are able to address the major chemical mechanisms involving particulate ammonium compounds, regional-scale ammonia emissions, particularly from agricultural sources, are highly uncertain. Given the relative lack of experience in controlling such sources, the costs and effectiveness of actions to reduce regional ammonia emissions are not adequately quantified at present. As noted above, ammonium would not exist in PM 2.5 if not for the presence of sulfuric acid or nitric acid; hence, decreases in SO2 and NOx can be expected ultimately to decrease the ammonium in PM2.5 as well. The additional regional limits on SO2 and NOx emissions outlined in today's notice added to those reductions provided under current programs would likewise be expected to reduce the PM2.5 effectiveness of any ammonia control initiative. Unlike ammonium, sulfuric acid has a very low vapor pressure and would exist in the particle with or without ammonia. Therefore, while SO2 reductions would reduce particulate ammonium, changes in ammonia would be expected to have very little effect on the sulfate concentration.
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> In addition, . . . because ammonium nitrates are highest in the winter, when ammonia emissions are the lowest, reducing wintertime NOx emissions may present a more certain path towards reducing this winter peak than ammonia reductions. Moreover, reductions in ammonia emissions alone would also tend to increase the acidity of PM2.5 and of precipitation. . . [T]his might have untoward environmental or health consequences.

70 Fed. Reg. 25181-25182 (May 12, 2005). The EPA also pointed out that given the uncertainties in ammonia emissions, the dispersed nature of sources and the lack of present controls, an effort to develop an ammonia program would likely take significantly longer than the significant NOx reductions EPA proposed in the Rule. *Id.* For all these reasons, the EPA concluded that it was both appropriate and necessary to focus on control of SO2 and NOx emissions, instead of ammonia, as the most effective approach to reducing PM2.5. NCBA urges the EPA to hold off on proposing any kind of a regulation of ammonia until emissions data are gathered and a determination of benefits is made from the impact of the CAIR and fine PM NAAQS regulation of SO2 and NOx. Ammonia regulation would impose huge costs on the livestock industry, and any benefits to the environment may be small.

Additionally, NCBA urges the EPA to consider the fact that the representation of atmospheric physics and chemistry of ammonia in air quality models is poor in comparison to current understandings of NOx and SO2. EPA, "Corrected Response to Significant Public Comments on the Proposed Clean Air Interstate Rule," April 2005, p. 120. By contrast, most SOx and many NOx emissions are from major point sources in urban areas that are easily monitored. It should also be noted that while rural sources may dominate ammonia emissions across large areas, urban sources may be more influential since the formation of secondary aerosols requires the coexistence of ammonia and SOx or NOx. Kirchstetter et al., "Ammonia Emission Inventory for the State of Wyoming," Kirchstetter et al. 2004, p. 4. Therefore, the accuracy of ammonia emissions estimates for sources that co-emit SOx or NOx, or emit into ambient plums of SOx or NOx is more important than their absolute magnitudes might suggest. For example, while livestock and fertilizer application emit ammonia, such emissions are generally farther removed from SOx and NOx sources than are urban sources, and are therefore less significant for fine PM formation.

It should also be noted that the maximum concentration of ammonium nitrates occurs in the winter, a period that is expected to have the lowest ammonia emissions from agricultural activities. Battye, W., V.P. Aneja, and P.A. Roelle, "Evaluation and Improvement of Ammonia Emissions Inventories," Atmospheric Environment 37 (2003), p. 3873-3883. By contrast, the potential PM2.5 benefit of reducing the ammonia emissions in the summer when they may be at peak is limited to the ammonium itself, because this is the time of lowest ammonium nitrate particle levels. 69 Fed. Reg. 4577. Therefore, limiting NOx emissions during these times is more effective than limiting ammonia emissions.

Finally, studies have shown that in areas where ammonia concentrations far exceed the amount of available nitrate, ammonia control is not an efficient method for the reduction of particulate nitrate. For example, a recent study was done on the effect of NOx, volatile organic compound and ammonia emissions control programs on the formation of particulate ammonium nitrate in the San Joaquin Valley ("SJV") where ammonia concentrations far exceed the amount of nitrate. Kleeman, Michael J. et al., "Control Strategies for the Reduction of Airborne Particulate Nitrate in California's San Joaquin Valley," Atmospheric Environment 39 (2005), p. 5334. When an analysis was done on the effectiveness of reducing ammonia emissions by as much as 80 percent, particulate nitrate concentrations were reduced by less than 10 percent. Id. at 5335. Further analysis showed that a 50 percent reduction in NOx emissions reduces maximum particulate nitrate concentrations by approximately 12 µg/m-3. Id. at 5336. A 50 percent reduction in VOC emissions reduced ground level particulate nitrate concentrations by only 7 µg/m-3. Id. at 5337. And, a 50 percent ammonia emissions reduction reduced such concentrations by only 4 µg/m-3. Id. at 5338. Therefore, even when ammonia emissions are substantially reduced in the SJV, sufficient excess ammonia is available to convert all of the nitric acid in the system to particulate nitrate. The study suggests that under these conditions, NOx control, not ammonia control, is the most efficient method to reduce the concentration of ammonium nitrate.

It is for these reasons that regulation of ammonia as a precursor to fine PM formation is unwarranted and premature.

IV. Possible Regulation of VOCs as a Fine PM Precursor

The potential regulation of VOCs emitted by concentrated animal feeding operations ("CAFOs") is unwarranted and premature. There are many unknowns about the source, type and volatility of any VOCs that may be emitted by a CAFO, as well as methods for controlling them.

VOCs can indirectly contribute to PM formation through the formation of oxidizing compounds such as ozone. Therefore, an analysis of possible CAFO contribution of VOCs to ozone formation is discussed below.

Ozone is formed by the reaction of reactive organic gases ("ROGs") and NOx in the presence of sunlight. Research results and published findings quantifying ROG emissions from CAFOs are limited and confounded by the fact that not all VOCs are ROGs. Capareda, S. et al., *Highly Reactive Volatile Organic Compound (HRVOC) Emissions from CAFOs*, Center for Agricultural Air Quality Engineering and Sciences ("CAAQES"), (2005) p. 1. Research has shown, however, that ROGs comprise a fraction of VOCs being emitted from CAFOs, and that the reactivity of ROGs varies. *Id.* Some ROGs, referred to as highly reactive volatile organic compounds ("HRVOC") can create 10 times more ozone per unit of ROG than those less reactive. *Id.* Study results indicate that VOCs emitted from agricultural facilities are different from those emitted from petrochemical and industrial facilities in the urban areas. *Id.* If the goal is to reduce ambient concentrations of ozone, the focus should be on reduced emissions of HRVOCs rather than VOCs. At this point, there is not a published list of CAFO RVOCs or HRVOCs. *Id.* p. 2. It is imperative that the scientific community agree on a common CAFO RVOCs definition and a list of compounds that qualify as HRVOCs or ROGs before CAFOs should be considered for regulation. Otherwise, the EPA runs the risk of regulating CAFOs based on questionable science without the probability of bringing about corresponding significant improvements in the environment.

The California Air Resources Board has decided to use the VOC emission factor of 19.8 pounds per dairy cow per year. This decision was based on highly questionable science. Consequently, there are efforts underway to develop a credible VOC emissions factor for dairy cows. One such research effort is being conducted by scientists at the University of California, Davis animal science department. Mitloehner, Frank, *Technical Proposal Volatile Fatty Acids, Amine, and Phenol Emissions from Growing and Finishing Feedlot Steers and Their Waste*, 2005. So far, that research has indicated that the CARB emission estimate is off by tenfold, and that trees and plants emit far more VOCs than cows. Mitloehner, Speech to the 35th Annual Alfalfa and Forage Symposium, as reported by Harry Cline of Western Farm Press, (Jan. 4 2006). The research is being conducted by measuring VOCs and other gases in experiments conducted in "environmental chambers" – air tight cattle corrals fitted with air monitoring devices. Id.

Mitloehner's findings so far indicate that dairy cows are not contributing nearly as much pollution to the environment as previously thought. Id. When cows were present in chambers, VOCs were less than 1 percent of total organic gas, which is a factor of ten times smaller than historical estimates used by air regulatory agencies. Id.

In addition, it is difficult to recommend mitigation procedures if the magnitude of VOC or HRVOC or ROG compounds are not yet known. The complexity of the chemistry of the formation of ozone from precursor emissions of VOCs and NOx has made it difficult to develop reliable control strategies designed to reduce photochemical oxidants. CAAQES p. 9. The effect of the VOC:NOx ratio further complicates the problem. *Id.*

Finally, it is assumed that any reduction in RVOC will result in a corresponding reduction in ozone formation. CAAQES p. 10. But, it is not yet known if such a reduction by CAFOs would result in such a benefit. *Id.* Requiring CAFOs to utilize as yet unknown BMPs to reduce RVOCs that may or may not be required to be reduced for environmental improvement is unacceptable. In addition, costs to do so would be prohibitive. A scientific basis for such a requirement must be shown before requiring CAFOs to undertake such costly measures.

It is for these reasons that the possible regulation of VOC emissions from CAFOs is unwarranted and premature at this time.

Thank you for considering NCBA's comments on this important rule.

Sincerely,

Tamara Thies
Director, Environmental Issues
National Cattlemen's Beef Association