

Midwest. The areas with lowest percentages tend to be in the southeast, where nitrates make up only 5 to 10% of the total $PM_{2.5}$ constructed mass.

The 2003 NARSTO-PM report ("Particulate Matter Science for Policy Makers: A NARSTO Assessment," February 2003) states, "Nitrates represent a major fraction of the $PM_{2.5}$ mass measured in some locations, though the management of the nitrate fraction via NO_x emission reductions needs to be addressed in combination with VOCs, NH_3 and SO_2 . This must be done in consideration of the relationship between nitrate production and local or regional ozone formation." The report also states, "Reductions of NO_x , VOCs, and associated NH_3 throughout the year in and around large urban areas may be important in the East as well as the West to bring down the nitrate contributions to the 24-hr and/or annual PM averages. While summer nitrate concentrations in eastern North America are low in comparison with other $PM_{2.5}$ components, higher winter nitrate concentrations occur in northern urban areas." The report goes on to indicate that the application of chemical transport models and comprehensive air quality monitoring will be useful in determining how best to address nitrates.

A number of factors should be taken into account when considering the two options for addressing NO_x as presented above. The first proposed option (which specifies that conformity demonstrations during the pre-SIP period must cover NO_x unless a finding is made that NO_x is *not* a significant contributor to the area's $PM_{2.5}$ problem) is supported by the fact that on a national basis, NO_x is clearly a significant contributor to the $PM_{2.5}$ problem, that nitrates constitute some portion of the problem in each metropolitan area, and that on-road sources are significant contributors of NO_x emissions in the potential nonattainment counties. In addition, assuming further sulfur dioxide reductions are required in order to attain the $PM_{2.5}$ standards, certain areas may see an increase in nitrate formation as sulfur dioxide emissions decline due to the reaction of ammonia with NO_x , which in relative terms would be more "available" for such reactions. In order to minimize this " NO_x disbenefit" situation, NO_x emissions should be further reduced at the same time. These factors may argue that a more environmentally conservative approach is needed to meet the Clean Air Act conformity provisions, and that NO_x should be considered in conformity

analyses under the first proposed option unless the State or EPA determine otherwise.

The second option (in which conformity demonstrations during the pre-SIP period must consider NO_x *only if* the State or EPA make a finding that NO_x is a significant contributor) is under consideration because the contribution of nitrates to total $PM_{2.5}$ concentrations in different metropolitan areas can vary significantly as noted above. In addition, this option would enable states to consider NO_x emission reductions in combination with potential reductions of VOCs, NH_3 and SO_2 as part of the process for developing an area's attainment demonstration (due within 3 years of the area's nonattainment designation), in which air quality modeling at a more refined spatial resolution (e.g. 12 kilometer grid size) would be performed. EPA seeks comment on the two options for addressing NO_x in conformity prior to $PM_{2.5}$ SIPs.

VOC precursor emissions. In 1999, on-road sources accounted for approximately 34% of the total VOC emissions in the 372 potential nonattainment counties for $PM_{2.5}$ (based on the 1999–2001 air quality data). Carbonaceous particles, which result, in part, from reactions involving VOCs, account for 25–70% of constructed fine particle mass measured at speciation trends network sites. The highest percentages of carbonaceous particles tend to be in California and the lowest percentages tend to be in the eastern United States.

Our understanding of the role of VOCs in $PM_{2.5}$ air quality problems continues to evolve. VOCs play several different functions in the formation of the organic fraction of $PM_{2.5}$. The 2003 NARSTO report characterizes VOC precursors into three main categories. High molecular weight organic molecules (*i.e.*, molecules with 25 or more carbon atoms) are either emitted directly as particles or as liquids that rapidly condense onto existing particles. Intermediate weight organic molecules (e.g., compounds with 7 to 24 carbon atoms) often exhibit a range of volatilities and can exist in both the gas and aerosol phase. For this reason they are also referred to as semivolatile compounds. These compounds react at higher temperatures to form secondary organic aerosols (SOAs). Aromatic compounds such as toluene, xylene, ethyl benzene are considered to be the most significant anthropogenic SOA precursors and have been estimated to be responsible for 50 to 70 percent of SOAs. The smallest organic molecules (*i.e.*, molecules with six or less carbon

atoms) occur in the atmosphere mainly as vapors and typically do not form organic particles at ambient temperatures. However, they participate in atmospheric chemistry processes resulting in the formation of ozone and certain free radical compounds (such as the hydroxyl ion [OH]). These free radicals participate in the oxidation of other gas-phase compounds (such as semivolatile aromatics) to form SOAs. The relative importance of each of these groups of organic compounds in the formation of organic particles varies from area to area. Also, the contribution of on-road source emissions to each of these three groups of organic compounds may vary from area to area.

Since on-road motor vehicles account for a substantial portion of total VOC emissions and on-road VOCs should be significant in many $PM_{2.5}$ areas, one could argue that the first proposed option is the most logical and environmental approach. Under this proposed option, VOCs would be considered in conformity automatically unless states or the EPA Regions determine that VOCs are insignificant for a given area. On the other hand, it may be appropriate to allow states and EPA the opportunity to evaluate the local significance of VOC emissions prior to consideration in conformity, given the likely variations between areas regarding the role of VOCs in the formation of $PM_{2.5}$. EPA seeks comment on the two options for addressing VOCs in conformity prior to $PM_{2.5}$ SIPs.

SO_x precursor emissions. EPA believes that statutory requirements are met under both proposed options if SO_x is only addressed in conformity if it is determined to be significant to an individual nonattainment area. Although SO_x may significantly contribute to total $PM_{2.5}$ in terms of emissions from all sources, emissions inventory data indicates that on-road emissions of SO_x generally represent a very small portion of the total SO_x emissions. Emissions inventory data for 1999 for the 372 potential $PM_{2.5}$ nonattainment counties for $PM_{2.5}$ (based on 1999–2001 air quality data) shows that on-road sources were responsible for only 2% of total SO_x emissions. By comparison, fuel combustion sources (e.g., electric utility and industrial combustion of coal and oil) were responsible for approximately 88% of the SO_x emissions in 1999 in these same counties.

In addition, EPA has already adopted two regulations that will greatly reduce emissions of SO_x from on-road sources by the time such regulations are both in full effect in 2009. First, in 2004 the low sulfur gasoline program begins to be