

Notes for Remarks on NAAQS PM Standards Framework

Made to CASAC PM Review Panel on behalf of two all volunteer Massachusetts Community Groups
The Mystic View Task Force (MVTF) and Somerville Transportation Equity Partnership (STEP)

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Dr. Henderson, Distinguished Members of the CASAC Particulate Matter Review Panel and Dedicated EPA Staff,

Thank you for allowing me three minutes of your valuable time. I am grateful to all of you for your efforts.

Identification: My name is Wig Zamore. I speak as a concerned citizen and live in Somerville, Massachusetts where I work with two all volunteer community groups, the Mystic View Task Force and Somerville Transportation Equity Partnership. I also serve on regional land use and transportation planning committees, have presented to the Massachusetts Clean Air (SIP) Steering Committee and represent the City of Somerville on Mass DPH and FAA committees concerned with airport related emissions, health and noise impacts.

Major PM Review Concern: My overwhelming concern is consideration of the impacts of large regional transportation systems on adjacent neighborhoods' health, including but not limited to chronic mortality impacts from chronic obstructive pulmonary disease, ischemic heart disease and lung cancer. **And how this gets into your framework as the methods for that are unclear.**

Geographic Scales: I believe that there are three important scales of geographic influence that require consideration, including two that you are already doing an excellent job with, as follows:

1. **Regional** or metropolitan (100s of kilometers) as in the Pope ACS cohort, the basis for EPA PM2.5 standards;
2. **Local** gradients within metropolitan areas (10s of kilometers) as in the Harvard Six Cities cohort and Jerrett's ACS Los Angeles sub-cohort. There was unanimity at the July 2007 EPA Research Triangle Park sessions that this is a proper scale of exposure analysis for combined primary and secondary PM2.5 gradients and health effects;
3. **Near source** (100s of meters) and outside past EPA aerosol measurement networks and the large cohort mortality studies mentioned above. **I believe that exposures within 1 kilometer, and especially those within several 100 meters of large sources, such as highways, may represent 50% of all PM related mortality in the US.** In order to assess these uniquely primary PM exposures and effects, you will have to rely on the smaller studies that you have financed through the PM research universities, on other North American studies, and heavily on European studies.

Near Source Issues: Near source issues cannot be addressed by your current scale of geographic metrics and we unfortunately have very few near source mortality studies from North America - really only the Jerrett ACS Los Angeles lung cancer outcomes and Jerrett and Finkelstein's near highway cardiovascular study from Hamilton, Ontario.

It is clear from the California Children's Health Study and many near highway pollutant gradient investigations that additional near source aerosol metrics are needed. The health effects experienced by these populations, made vulnerable by virtue of their location next to large regional transportation sources, are much steeper than PM2.5 mass based gradients, which are therefore not a viable metric. I would suggest that they are also steeper than NO2 gradients from mobile sources. This is one reason there have recently been so many traffic proximity studies.

I do think PM is the criteria pollutant under which these issues must be addressed. The gradients of freshly nucleated and condensing primary Ultrafine Particles from these sources are very steep though. Near highway coarse PM gradients can be quite steep as well. Besides the Los Angeles PM Research Center studies - aerosol and children's

asthma and lung function - the near highway cardiopulmonary studies coming out of Germany have similarly steep health effects. I would also suggest that a reconsideration of the Oslo and Stockholm lung cancer studies, especially Nyberg's, will show that all of the statistical significance came from the highest decile of NO₂/NO_x exposure.

Consideration of Metropolitan Planning Organization travel demand model data from the US suggests that there is roughly two orders of magnitude difference in fresh mobile emissions between the 95% and the 5% levels. Ambient levels of some mobile pollutants will be flattened considerably by evolution and dispersion, but are still far greater than currently recognized in our environmental health protection strategies. However, other ambient pollutant metrics, such as particle number counts, are likely to be even steeper than the MOBILE emissions calculations.

A large number of US citizens, including a disproportionate fraction of the Environmental Justice population, live in the higher exposure Traffic Analysis Zones. US Census figures suggest that 9% of all US population and 18% of all renters live within several hundred meters of a 4-lane or larger highway, a diesel rail corridor, a port or an airport. This is a large exposed population that is extremely vulnerable and without sufficient health protection under the current PM framework.

For those most exposed over the long term, fresh mobile pollutants are, I believe, causing roughly a 50% increase in relative risk of heart attack and lung cancer mortality, and perhaps a 20% overall mortality increase, assuming the Pope and Dockery regional and local relationships across ICD mortality categories hold. For many of these very exposed highway and regional transportation adjacent neighborhoods, this is a more serious health issue than total risk of mortality due to HIV/AIDs, diabetes, murders, suicides, traffic accidents or other accidental deaths.

What to Do? Separate the near source scale of analysis, which will require not only a new effort to understand emerging literature but also a new framework. Figure out how to integrate the relevant PM research center work with the existing EPA PM framework. Rely on expert panels and perhaps a conference dedicated to this purpose. Utilize at least European studies, rather than just those from North America. Compare occupational health studies and near source studies. The exposures and health outcomes may be surprisingly similar - e.g., the Nyberg Oslo lung cancer study may be compared with a series of transportation worker occupational studies authored by Garshick, Smith, Laden and others at Harvard.

Consider relevant nanoparticle research. Very recently the total number of "nanoparticle" studies indexed by PubMed (over 11,000) has zoomed past those on more traditional "air particle or air particulate" topics (over 10,000). The pharma companies interest in nanoparticles has been strongly driven by their understanding of the astounding efficiency of delivery when substances are delivered in vivo by very small particles as opposed to in solution or by larger particles. These results mimic the outcomes of near source UFP exposure gradient and health effects studies.

It is critical to develop a deeper understanding of Ultrafine Particles (UFP) including semi-volatile components, and of associated Particulate PAH as well as included metals. With some of these, especially PPAHs, there are welfare as well as primary health effects. Please consider a Particle Number Count standard with a bottom rather than a top cut point - perhaps practically set at 5 nanometers. Additionally you may want to consider whether a PM₁₀, PM₁, PM₁ organization of PM science would be more effective than the current PM₁₀ and PM_{2.5} divisions. Doing so would require co-location of PM equipment, especially PM_{2.5} and PM₁, to effect an orderly transition. Finally, if an appropriately located UFP measurement network is not set-up soon, as well as a better framework to understand the associated health parameters, these primary near source health effects will unfortunately continue their rampage unabated past the next several PM NAAQS reviews. **Any continued scientific or policy driven reticence in facing these important matters will result in great public health harm.**

Thank you very much for your time and attention,

Wig Zamore