Achieving Balance in the NARSTO PM Science Assessment and the Policy Questions

Issue:

Providing *a synthesis and evaluation* of the policy relevant scientific findings, methods and recommendations that are timely and useful for developing air quality implementation plans and mid-course corrections to those plans - the focus being on those issues which will advance effective reduction in PM exposure.

Background and Guideposts:

(Adapted from: Review of the NARSTO Draft Report: An Assessment of Tropospheric Ozone Pollution - A North American Perspective by the Committee to Assess the NARSTO Program, National Research Council, Chair: M. Russell)

Building on the guidance provided in the NRC review of the Ozone Synthesis Report some specific direction is provided to the assessment authors to ensure that the information needs of the policy community are met in responding the policy questions that have been developed to date. Specifically the PM science assessment must contain an orderly presentation of the elements of the PM problem that starts with the policy goals and then lay out the issues to be resolved. This will include a discussion of where scientific knowledge appears to be sufficient, where important uncertainties lie and where and how further advances in science would assist in PM management in N. America. Within this framework authors can explain why various scientific aspects of the PM issue are important to the policy community, provide direction as to what additional information could contribute to regulatory and other government decisions and thereby contribute to the overall priority setting exercise begun in the NARSTO Particle Research Strategy. The policy relevance of the science needs to be illustrated in a structure manner that enables the reader to understand the implications for action (for example, action to reduce the most reactive VOCs relative to aerosol formation may alleviate local problems but has the potential exacerbate LRT problems). It must also be written in a manner that aids communication to a lay audience.

> **#1** Be mindful of the need to organize all of the scientific information presented such that it addresses and informs the policy issues facing environmental managers and regulators to the extent possible.
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> **#2** Priorities should be tied to the decision-making process, that is, how will the new knowledge help make better decisions to improve air quality.
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> **#3** Provide explicit consideration of how implications of the science, or recent advances in the science, could apply to new approaches to reducing PM concentrations.
>
> **#4** Be mindful of the treatment of interconnections among air quality issues: the multi-pollutant atmosphere.

Policy Questions in PM Standards Implementation with Ties to Atmospheric Science

There are two paths. The first is that of determining the ambient[1] concentrations required to protect public health and welfare, i.e.: the ambient - receptor relationship. The second (of relevance to the PM assessment activity) is how to achieve that ambient concentration, i.e.: the source - ambient relationship. In following the second path decision makers progress through several basic issues all of which require the application of atmospheric scientific understanding and science tools. This is the process we are supporting.

[1] Ambient concentrations and human exposures to pollutant PMx are not the same thing and differ according to time spent in enclosed and separately controlled environments e.g., homes, automobiles, work locations. Atmospheric Process researchers recognize this difference, and the need to work with the Human Exposure research community to answer policy maker questions on actual human exposures.

1. Do we have a significant pollutant PMx[2] problem, and how confident are we?
   - ¥ How far above the levels of the standard are we, and is any exceedance a rare event, or an intermittent to ongoing occurrence?
   - ¥ How certain are we of our data, and in our trends?

2. Where we have a pollutant PMx problem, what is the source of the concentrations we observe now and in the future?
   - ¥ What is transported vs. generated in our area?
     For that generated in our area what is natural vs anthropogenic?
     For that transported in what is natural vs anthropogenic?
   - ¥ What are the particular sources which make-up the natural and anthropogenic fraction?
     That are generated locally and that are transported in?
   - ¥ Again, how certain are we?

3. What broad approaches might we take to fix the problem? What pollutants need to be reduced and by how much to bring our PMx concentrations down to acceptable levels?
   - If we control locally?
   - If we and others upwind both control?

4. What specific options do we have for fixing the problem? Given the broad control approaches above, what source control alternatives do we have and where can we get the biggest improvements in air quality?
   - ¥ How is what we are doing now and have on the books working and expected to work?
   - ¥ How much more control will be needed now and in the future?
   - ¥ What source sectors could be further controlled and by how much to meet our need ?

5. What are the relationships between the pollutant PMx problem and other problems we are working on, particularly considering its sources and control options (see Q s 2-4 above)?
   - ¥ What is the relationship to the ozone problem? The regional haze issue? The acid deposition problem? The global climate and Uvb issues? The air toxics problem?

DECISION POINT ON CONTROLS BY POLICY MAKERS
(Incorporating 1-5 above, co- & dis-benefits on other pollution problems, sector economic health -willingness to pay, legal constraints - precedents and delays, societal and political pressures - potential impacts on elections and administrations)

6. How can we measure our progress? How can we determine the effectiveness of our actions in bringing about: emissions reductions, air quality improvements, and corresponding health improvements?
   - ¥ What source and ambient measurements do we need ?
   - ¥ What criteria of success should be used?
   - ¥ What daily air quality forecasting and indexes are possible?

7. When and how should we reassess and update our control program to adjust for any weaknesses in our plan, and to take advantage of advances in science and technology? How should we evaluate the effectiveness of implementation actions?

8. What further atmospheric sciences information will be needed in the periodic reviews of our national standards?
   - A. In relating what it is about PMx (ambient characterization as a surrogate*) that is responsible for its toxicity ?
   - B. In relating human exposures (ambient concentrations as a surrogate*) to health risks?

[2] PMx refers to various size fractions e.g.: <1 μm, <2.5 μm etc., that have been adopted as air quality standards.