

Conclusions and Recommendations: Multipollutant Assessment

*2009 Executive Assembly
April 15, 2009
Washington, D.C.
William T. Pennell
Management Coordinator*



Multipollutant Air Quality Management (MPAQM)



Levels of Multipollutant Management

- Level 1: Focus on individual pollutants and attainment of Standards
- Level 2: Attainment of Standards, but with increasing attention to co-benefits attainable through coordinated emissions reduction
- Level 3: Decisions based on achieving greatest risk reduction based on single-pollutant exposure-dose-response
- Level 4: Decisions based on achieving greatest risk reduction based on multipollutant exposure-dose-response



Conclusions: MPAQM

1. The basic technical capabilities for coordinating AQM strategies and implementing multipollutant air quality management at Levels 1 and 2 currently exist
2. Many of the basic capabilities for implementing MPAQM at Levels 3 and 4 exist (e.g., risk assessment frameworks, emissions models, AQ models). The principal missing features are exposure-dose-response information for determining relative risk of exposure to single and multiple pollutants
3. A step towards relative-risk decision-making might be to assess comparative risk on the basis of exposure to individual pollutants as indicators of the risks of exposure of broad population categories to compositionally complex emissions



Conclusions: MPAQM

4. In the future, MPAQM could be complicated by three global-scale influences:
 1. Changes in precursor emissions resulting from actions taken to reduce emissions of GHGs and climate affecting particles
 2. Changes in atmospheric chemistry, biogenic emissions, and meteorological conditions resulting from climate change
 3. Intra- and intercontinental transport of pollutants and precursors resulting from increased global emissionsOf these three, 1 could be the most significant over the longer term



Recommendations: MPAQM

1. Improve the ability to estimate pollutant exposure
2. Strengthen the multidisciplinary focus of health and ecosystem effects research
 1. What is the health and ecological damage burden of air pollution relative to other stressors?
 2. Which pollutants or combinations of pollutants cause what effects?
 3. Is it feasible to group pollutants in order to expedite research on the effects of exposure to multiple pollutants?
 4. Can we construct objective metrics for prioritizing health and ecosystem effects?



Recommendations: MPAQM

3. Improve emissions characterization and AQ modeling capabilities, including scale resolution
4. Modify AQ monitoring networks as required to provide support for MPAQM
5. Implement one or more nationally-oriented MP air quality management feasibility studies to assess implementation of risk- and performance-based AQM
6. Analyze the potential effects of technological change on future air quality and its implications for human and ecosystem health



Accountability



The Accountability Chain

- Were recommended AQM actions implemented?
- Were intended emission reductions achieved?
- Were ambient concentrations or deposition reduced by the amounts expected?
- Was human and ecological exposure reduced as expected?
- Were intended human health and ecosystem benefits realized?



Conclusions: Accountability

1. There have been no complete formal retrospective analyses, down the accountability chain, of specific air quality management actions (including assessment of the original predicted benefits)
2. Uncertainties in emissions information remain an important barrier to implementing accountability
3. Given reasonably reliable emissions information, it is feasible to determine whether or not a specific AQM action has had its intended effect in reducing ambient concentrations, deposition, or visibility (visibility is, per se, an AQM endpoint)
4. Demonstrating that specific AQM actions have resulted in the predicted effects on human health or ecosystem function is extremely difficult



Conclusions: Accountability

5. For air pollutants with reliable biomarkers assessing the effects of AQM actions on exposure is relatively straightforward as long as the source and pathway of exposure is clear
6. If accountability is adopted as a tool for evaluating and adjusting AQM actions, it must become an integral part of the AQM process
7. For some applications accountability has advanced further for ecosystem effects than for human health effects; however, verification of ecosystem response or recovery to changes in exposure has been difficult to ascertain in many cases



Recommendations: Accountability

1. Two or more retroactive test cases should be undertaken to evaluate current capabilities for demonstrating accountability, particularly the assumption that it is feasible to demonstrate that a specific AQM action has had the predicted effect in reducing ambient concentrations or deposition
2. To bridge the emissions barrier, increased attention must be given to improving emissions information (see MPAQM recommendation 3)
3. Continued research is needed on methods for determining the effects of specific AQM management actions on human health outcomes



Recommendations: Accountability

4. Rethink the design of current monitoring approaches in order to improve the ability to assess exposure
5. As feasible, identification of biomarkers for a larger number criteria air pollutants and air toxics should be a priority for both health and ecosystem impacts assessment

