Conclusions and Implications

Hilary Hafner
Mike McCarthy
Sonoma Technology, Inc.
Petaluma, CA

Presented to:
Air Toxics Data Analysis Workshop
Rosemont, IL
October 4, 2007

STI

905306-3236

Toxics Monitoring Program Objectives

1. Trends
   - Provide a measure of accountability and progress
2. Exposure assessments
   - Support exposure assessments by serving as a surrogate for personal exposures
   - Provide direct input for detailed human exposure models
3. Air quality model evaluation
   - Provide basic ground truthing for air quality models, with corresponding implications for emissions strategies, exposure assessments, and accountability
   - Provide direct input for source-receptor models
4. Program accountability
5. Problem identification
6. Science support

Final Draft, National Monitoring Strategy Air Toxics Component, 2004
http://www.epa.gov/ttn/amtic/toxover.html

Conclusions: MDLs Are Too High

- Method detection limits (MDLs) should be low enough to
  - Determine if pollutants are at levels of concern to human health
  - Quantify those values for use in risk assessments
- 60% of reported air toxics measurements are currently below MDL for data from 2003-2005
- Specific pollutants that are known or suspected to be above levels of concern that should be targeted include:

  acrylonitrile, arsenic, 1,3-butadiene, tetrachloroethylene, 1,4-dichlorobenzene, cadmium, ethylene dibromide, 1,1,2,2-tetrachloroethane, hexachlorobutadiene, and benzyl chloride

Conclusions: Insufficient Monitors

Some pollutants of concern to human health were measured at a low number of sites from 2003-2005.

- Acrolein, naphthalene, and ethylene oxide are on the list of TO-15 feasible compounds, but were not routinely measured using this method.
- Chromium VI measurements are also sparsely reported.

Conclusions: Risk and Hazard

- Which air toxics are the most important from a national ambient monitoring risk/hazard-weighted perspective?
  - Cancer risk, *high confidence* that these air toxics are above levels of concern: benzene, carbon tetrachloride, arsenic, 1,3-butadiene, acetaldehyde
  - Cancer risk, *medium confidence*: acrylonitrile, 1,4-dichlorobenzene, ethylene oxide, tetrachloroethylene, nickel (TSP and PM_{10}), naphthalene
  - Cancer risk, *unknown*: ethylene dibromide, 1,1,2,2-tetrachloroethane, benzyl chloride, hexachlorobutadiene, cadmium, chromium VI, ethylene dichloride, ethylene dichloride, 1,2-dibromo-3-chloropropane, 1,2-dichloropropane, 1,1,2-trichloroethane
  - Noncancer hazard, *high confidence*: acrolein
- Spatial variability in risk- and hazard-weighted concentrations is not important at a national level. Most pollutant concentrations do not vary enough to matter relative to levels of concern (i.e., pollutants are either above or below, and not at the cusp).

Conclusions: Trends

- Most of the trends we can measure show declining concentrations.
- Of the key risk drivers, we can with confidence say that benzene, 1,3-butadiene, carbon tetrachloride, tetrachloroethylene, and 1,4-dichlorobenzene are declining at most sites.
- Acetaldehyde has an even distribution across sites of increasing and decreasing trends.
- Acrolein, arsenic, acrylonitrile, ethylene oxide, and naphthalene trends could not be quantified nationally.

Conclusions: Accountability

- Trends in concentrations of primary hydrocarbons were linked to mobile source fleet turnover nationally
  - Sites were classified using trends data as mobile source dominated, mobile source influenced, or dominated by other sources
  - Regional differences in site classifications suggest different source mixes
- Linking control measures to specific trends is more difficult
  - Available control measure information suggests most MACT controls would not be large enough to detect at a national level
  - Monitoring sites need to be near enough to sources of interest to detect changes
  - Concentrations at monitoring sites need to be above detection limits and reliable when control measures are implemented