Air Toxics Ambient Monitoring

Air Toxics Data Analysis Workshop
October 2-4, 2007
Chicago IL

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Office of Air Quality Planning and Standards
US Environmental Protection Agency
Research Triangle Park, NC
Agenda

- Program Background / Overview
- Funding
- NATTS
- Community-Scale Projects
- Methods
- Conclusions
Air Toxics (a.k.a. Hazardous Air Pollutants or HAPs)
- Pollutants that are known or suspected to cause cancer or other serious health effects
- Principle pathway for most HAPs is inhalation
  - Deposition not a focus of NATTS / Community-Scale program

Occurrence
- Localized high concentrations / source oriented
- High concentration locales – often heavily industrialized areas
- HAP ambient concentrations of concern based on health risks

Analysis of ambient air monitoring data can be an effective means of assessing:
- Air quality and associated potential health risks
- Trends and regulatory program effectiveness
**NATTS**: National Air Toxics Trends Stations
- 25 sites across CONUS
- Long-term (i.e., trends)

**CSM**: Community-Scale Monitoring
- Competitively awarded grants (37 to date)
- ~ 2 yr duration

**Other S/L**:  
- Varies from year to year
- Many are seasonal VOC only

**UATMP**: Urban Air Toxics Monitoring Program
- Nat’l contract for sampling support / lab analysis
Air Toxics Monitoring Timeline

1999
• Initial (annual) Air Toxics Monitoring appropriation: $3M STAG 103 funds
• Air Toxics Monitoring Steering Committee formed

2000
• 23 NATTS established
  ✓ Based on pilot projects / LADCO data analyses
  ✓ Included 5 pilot sites

2001
• Pilot projects

2002
• 04 CSM awarded

2003
• 03 CSM awarded

2004
• 04 CSM complete
• 05 CSM awarded

2005
• 05 CSM complete
• 07 CSM awarded

2006
• 04 CSM solicited

2007
• 05 CSM solicited / selected

2008
• 07 CSM solicited / selected

Legend:
Monitoring
Data Analysis
Funding

OAQPS Data Analysis

LADCO data compilation and analyses

$6.5M STAG 105 shifted from criteria to toxics

Air Toxics Data Analysis Workshop

• STAG 103 appropriation increased by $7M
• 04 Community-Scale Monitoring (CSM) projects solicited
Funding History

- **STAG Section 103**
  - $3M / year beginning FY 99; increased to ~$10M / year beginning FY 04
    - FY 04 President's Budget requested an additional $7 million in STAG in response to the OMB finding that the air toxics program lacked sufficient monitoring data
    - Congress provided the additional funds; community-scale air toxics ambient monitoring studies initiated across U.S. in 2005
  - Funds reallocated to different media program in FY 07; anticipate ~$10M in FY 08

- **STAG Section 105:** $6.5M / year beginning in FY 01
FY07 Funding Adjustments

➢ Funding Scenario
  ✓ FY07 Air Toxics STAG 103 redirected (unavailable)
  ✓ Available: ~$6M+ (recertified from FY06)

➢ Revised approach to NATTS grants
  ✓ One-time project period reduction (12 to 6 months)
  ✓ For CY08, Jan 1 – Jun 30 (vice Jan 1-Dec 31)
    o Net Effect
      • Restore a portion of ‘07 Community-Scale funding
      • Decrease NATTS funding lag

➢ Revised Community-Scale (recent competition)
  ✓ Anticipated Funding: ~$8.05M
    o FY07 E1C: $3.49M and FY08: $4.56M
  ✓ Awards: upon funds availability (Nov ‘07 – Feb ‘08)
FY08 and Beyond

FY08

✓ NATTS
  o Operations and Maintenance $4.48M
  o Quality Assurance $ .33M
  o Methods / Instrumentation $ .18M
  o Data Analysis $ .30M

✓ Community-Scale
  o 2007 Competition $4.56M (~$8.05M total)

FY09 - FY11

✓ Approximate same distribution as FY08
✓ FY11: assess CY05–CY10 NATTS data for trends
Initial network: 23 sites (15 urban, 7 rural)
- 12 sites established in 2003
- 11 more sites established in 2004
- Limited data for 2003/04; first full year 2005

Principle Objective: trends and accountability

Scale: urban (5 km) and greater

Leveraging: all collocated with PM$_{2.5}$ speciation samplers, some also with PAMS

Sampling and analysis: VOCs, carbonyls, PM$_{10}$ HAP metals, TSP hexavalent chromium
- Select sites now also monitoring for PAHs

All sites follow prescribed QA program
NATTS Expansion

- Increase number of sites
  - Two sites were added in 2007 (Los Angeles and Rubidoux)
  - Three or four will be added in 2008
    - Further expansion not anticipated
  - Key selection factors include
    - High HAP-related risk (NATA) – especially with regard to stationary source component
    - Substantial population (number and density)
    - “Geography”
    - NCore collocation
  - Two likely sites: Pittsburgh PA and Portland OR
NATTS Expansion (cont.)

- Add PAHs at all sites
  - Full implementation by July 1, 2008
  - PAH monitoring “pilot” at the following:
    - Chesterfield SC and Houston TX
      - Sampling and analysis by operating agency
    - Atlanta GA
      - Collocated sampling and analysis by operating agency
      - 10% of collocate samples analyzed by national contract lab (results to date quite comparable)
    - Phoenix AZ, Los Angeles and Rubidoux CA
      - National contract lab only
      - Collocated at Rubidoux
        - Aug – Dec, 1 in 6; 10% thereafter
Typical *analytical* costs per site per year (*includes PAH*)

- Does not include sampling equipment or site operations and maintenance

<table>
<thead>
<tr>
<th>HAP Category and Method</th>
<th>Cost Per Sample</th>
<th>Number of Samples</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC Sample Analysis Using TO-15</td>
<td>391</td>
<td>66</td>
<td>25,806</td>
</tr>
<tr>
<td>Carbonyl Sample Analysis Using TO-11A</td>
<td>139</td>
<td>78</td>
<td>10,842</td>
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<tr>
<td>Category V (Metals by ICP/MS)</td>
<td>247</td>
<td>72</td>
<td>17,784</td>
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<tr>
<td>Hexavalent Cr Sampling and Analysis</td>
<td>184</td>
<td>78</td>
<td>14,352</td>
</tr>
<tr>
<td>PAH / SVOC Using TO-13A</td>
<td>507</td>
<td>72</td>
<td>36,504</td>
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<td></td>
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<td>105,288</td>
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</tbody>
</table>

- 104 target HAPs in 5 categories
  - Disparate sampling and analysis equipment and methods associated with each pollutant category at each site
## NATTS Sites and Pollutants

### Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roxbury MA</td>
<td>Houston TX</td>
</tr>
<tr>
<td>Providence RI</td>
<td>Bronx NY</td>
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<tr>
<td>Washington DC</td>
<td>Hazard KY</td>
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<tr>
<td>Dearborn MI</td>
<td>St. Louis MO</td>
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<tr>
<td>San Jose CA</td>
<td>Bountiful UT</td>
</tr>
<tr>
<td>Seattle WA</td>
<td>Los Angeles CA</td>
</tr>
<tr>
<td>Underhill VT</td>
<td>Rubidoux CA</td>
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<tr>
<td>Rochester NY</td>
<td></td>
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<tr>
<td>Chesterfield SC</td>
<td></td>
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<tr>
<td>Chicago (Northbrook) IL</td>
<td></td>
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<tr>
<td>Mayville WI</td>
<td></td>
</tr>
<tr>
<td>Harrison County TX</td>
<td></td>
</tr>
<tr>
<td>Grand Junction CO</td>
<td></td>
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<tr>
<td>Phoenix AZ</td>
<td></td>
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<tr>
<td>La Grande OR</td>
<td></td>
</tr>
<tr>
<td>Tampa FL (1) – Hillsborough Co.</td>
<td></td>
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<tr>
<td>Tampa FL (2) – Pinellas Co.</td>
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</tr>
<tr>
<td>Atlanta (Decatur) GA</td>
<td></td>
</tr>
</tbody>
</table>

### Pollutants *(Minimum Requirements)*

#### VOCs by TO-15 (analysis by GC/MS SIM)
- Acrolein
- Perchloroethylene
- Benzene
- Carbon Tetrachloride
- Chloroform
- Trichloroethylene
- 1,3-butadiene
- 1,2-dichloropropane
- Vinyl Chloride
- Dichloromethane

#### Carbonyls by TO-11A
- Formaldehyde
- Acetaldehyde

#### PM10 Metals by IO 3.5
- Nickel compounds
- Arsenic compounds
- Cadmium compounds
- Manganese compounds
- Beryllium compounds
- Lead compounds

#### TSP Metal by modified CARB Method 039
- Hexavalent Chromium

#### SVOCs / PAHs by TO-13A
- Benzo(a)pyrene
- Naphthalene

*21 required of 104 target HAPs*
Community-Scale Air Toxics
Ambient Monitoring

- Middle and Neighborhood scale (.5km to 4 km) air quality issues, where not addressed by NATTS network
- Competitively awarded grants / cooperative agreements
  - Grant competition centrally managed (Program Office)
  - Awards and post-award oversight by Regional Offices
- FY2004 – $6.2 Million
  - 17 projects awarded from 49 proposals
  - Project completion dates from latter 2006 through 2007
- FY2005 – $6.5 Million
  - 19 projects awarded from 56 proposals
  - Project completions anticipated 2008
Community-Scale Air Toxics Ambient Monitoring (cont.)

- FY2006 / 2007 / 2008 (combined) ~ $8.05 Million
  - Three bins / categories
    - Community-scale assessments
    - Methods Development / Evaluation
    - Analysis of Existing Data
  - 23 of 60 projects recommended for award
    - Details embargoed (Congressional notification)
  - Awards anticipated late 2007 / early 2008
  - Project completions anticipated during 2010
Local-scale monitoring projects FY 05

Project sites:
- Source identification and characterization
- Methods development
- Method evaluation and comparison
- Community-scale monitoring

- Idaho DEQ
  Treasure Valley, ID
- Nevada DEP
  Mercury
- Placer Co. APCD
  Roseville Railyard
- City of Los Angeles
  Los Angeles, CA
- San Diego APCD
  San Diego, CA
- City of Albuquerque
  Albuquerque, NM
- Boulder CHD
  Boulder, CO
- Wisconsin DNR
  Passive sampling
- New York SDEC
  Syracuse, NY
- New York SDEC
  Tonawanda, NY
- Connecticut DEP
  Wood smoke
- New Jersey DEP
  Chrome-6 method
- Virginia DEQ
  Hopewell, VA
- Cherokee Nation
  Cherokee Heights, OK
- Texas DHHS
  Ship channel
- Palm Beach CHD
  Agricultural burning
NATTS Method Focus Group

- Group comprised of NATTS laboratory contacts, consultants, and EPA Region / Program Offices
  - Goal is to resolve NATTS method inadequacies and inconsistencies
  - Desired “bonus” result includes transfer to non-NATTS

- Several issues have been raised for discussion
  - Group will focus on one issue at a time
    - Issue priority not yet fully established
  - Each issue will have a lead
    - Issue lead will be responsible for preparing brief issue “statement” to frame issue for discussion

- Agreements or resolutions will be documented and incorporated into the NATTS TAD
NATTS Method Issues Identified

Issues raised thus far include:

- Calibration standard consistency
  - *First (and current) issue*
- Method Detection Limits (MDLs):
  - Inconsistencies in determination
  - Acceptable levels and data reporting / flagging
- HAP priority pollutants and associated MQOs / DQOs
- Acrolein and VOCs by Method TO-15A
  - Inconsistencies in sampling and analysis approaches (and PT results) remain
- Polycyclic Aromatic Hydrocarbons (PAHs) by TO-13A / ASTM D6209
Chrome VI sampling and analysis
  ✓ Sample stability issues remain
PT sample preparation
Higher molecular weight aldehydes by TO-11A
  ✓ Some interest in discussing feasibility
Persistent analytical method background issues
  (e.g., methyl ethyl ketone - MEK)
  ✓ Labs with concerns about having these issues and how to remove background laboratory contaminants
NATTS Guidance Documentation

- **Workplan Template**
  - Intended to promote sampling, analysis, and data reporting consistency across NATTS
  - Revised version will be developed and distributed coincident with FY08 funds distribution

- **Technical Assistance Document (TAD)**
  - Same intent as workplan, but much greater detail / descriptive technical content
  - Section 5 (Data Management) recently revised
  - Balance of TAD revisions to begin soon and will reflect Method Focus Group output
Conclusions

- **Successes**
  - ✓ Great strides made over past several years
    - o Increasingly consistent application of sampling and analysis methodologies
    - o Steadily improving QA and data reporting results
    - o Data analysis efforts beginning to evaluate and quantify trends, assess program effectiveness, and identify areas and pollutants of concern / priority
    - o Ambient data used to develop CMAQ boundary conditions
  - ✓ Local-scale monitoring projects beginning to yield results
    - o First round of projects concluded; project results being assessed by appropriate Agency staff
    - o Quality projects underway; new projects also promising
Conclusions

Next Few Years
- Continue to strive for consistency!
- Continue LSM project grant competitions
- Assess LSM project results as they become available; look for commonalities, differences, and implications thereof
- NATTS trends work (2011) and continuation of data analysis efforts

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