Monitoring and Analyses

A little about a lot!

AQS Conference, 5/26/04
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Monitoring & Analyses Topics

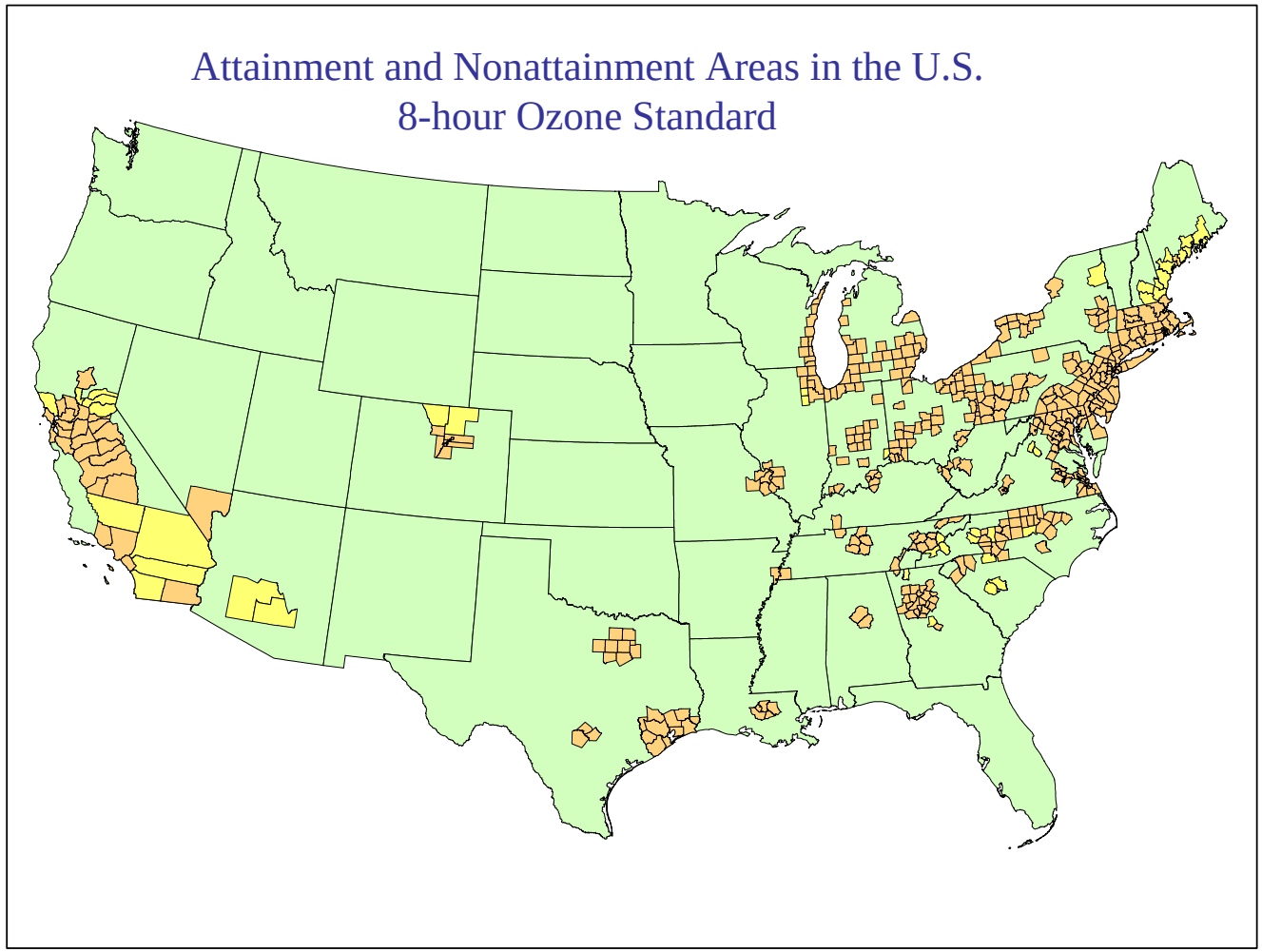
- Data Utilization
- Data Access / Analyses Tools
- AQS Metadata & More-data
- Monitoring Updates & Regulatory Changes

Monitoring & Analyses – Data Utilization

- Data Utilization
  - Ozone Designations
  - The Ozone Report
  - PM Designations
  - The PM report
  - Trends Reports
  - AIRNow
  - Clean Air Interstate Rule (aka Transport Rule, IAQR)
- Data Access / Analyses Tools
- Metadata & More-data
- Monitoring Updates & Regulatory Changes

8-hr Ozone Designations

- Areas designated 4/15/04
- Based on ’01-’03 AQS data



- Attainment or Unclassifiable Areas (2668 counties)
- Nonattainment Areas (432 entire counties)
- Nonattainment Areas (42 partial counties)

8-hr Ozone Designations, cont.

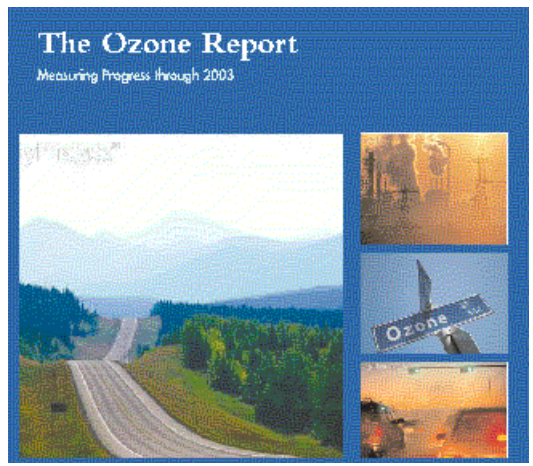
- Once designations and classifications take effect on June 15, 2004, state, tribal and local governments must prepare a plan which describes their efforts to reduce ground-level ozone. (SIPS)
- Many areas categorized as *basic* (Subpart 1) nonattainment (NA) areas. They will have to comply with the more general NA requirements of the Clean Air Act. EPA classifies ozone NA areas based on the severity of their ozone problem. Classified areas fall into five categories: marginal, moderate, serious, severe, or extreme
- This designation rule also defers the effective date of nonattainment designations for certain areas. These communities, known as *Early Action Compact areas*, have signed innovative agreements with EPA to reduce ground-level ozone pollution sooner than the CAA requires.
- http://www.epa.gov/ozonedesignations
- (Barry Gilbert, Terence Fitz-Simons)

Category and Classification Summary
8-hour Ozone
Nonattainment Areas

Category Classification	Areas	Counties	Population
Severe 17	1	4	14,593,587
Serious	3	15	5,494,465
Moderate	30	185	81,010,125
Marginal	7	55	13,932,637
Subpart 2	41	255	115,030,814
Subpart 1	72	175	34,831,267
Subtotal	113	428	149,862,081
EAC			
Moderate	1	8	1,285,879
Subpart 1	12	38	8,150,860
EAC	13	46	9,436,739
Total	126	474	159,298,820

The Ozone Report

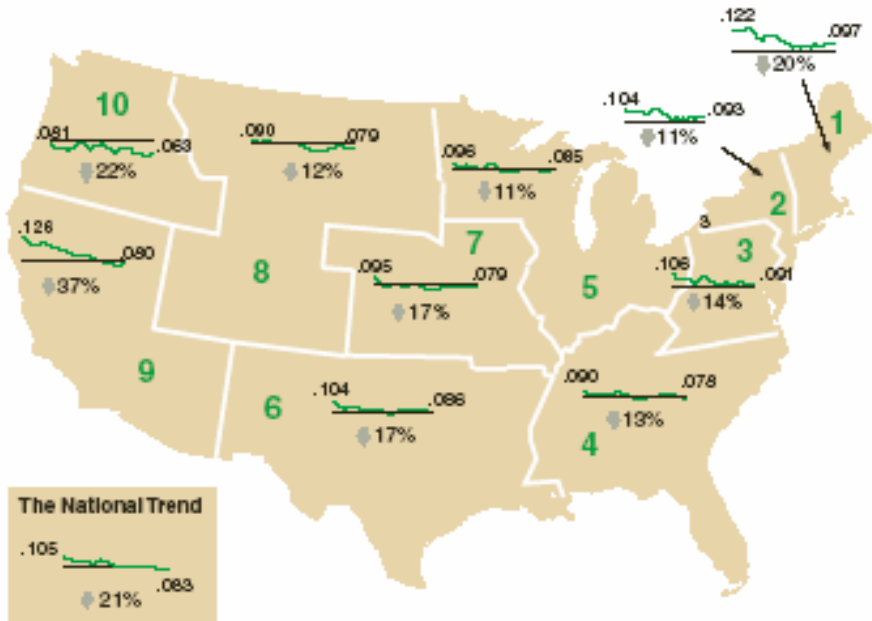
- Released last month
- Purpose of booklet ....
  - Better characterization of the linkages between regulatory actions, human activities and changes to air quality.
  - Provide 2003 ozone trends information to the public to coincide with:
    - Beginning of ozone season
    - ALA data release
    - NOx SIP Call effective date (5/31/04)
    - Ozone designation process
- Hardcopy and online
  - http://epa.gov/airtrends/ozone.html
- (Dennis Doll, Rosalina Rodriguez)



The Ozone Report, cont.

- Ozone levels across the nation were down substantially in 2003. The improved air quality resulted from favorable weather conditions and continuing reductions in emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs).
- Since 1980, the most consistent improvements in 8-hour ozone have been in the Northeast and southern West Coast.
- Nationally, 21% decline in 8-hr levels (rolling 3-yr 4th max avg)

Trend in Fourth Highest Daily Maximum 8-Hour Ozone Concentration (ppm) by EPA Region, 1980–2003.



The Ozone Report, cont.

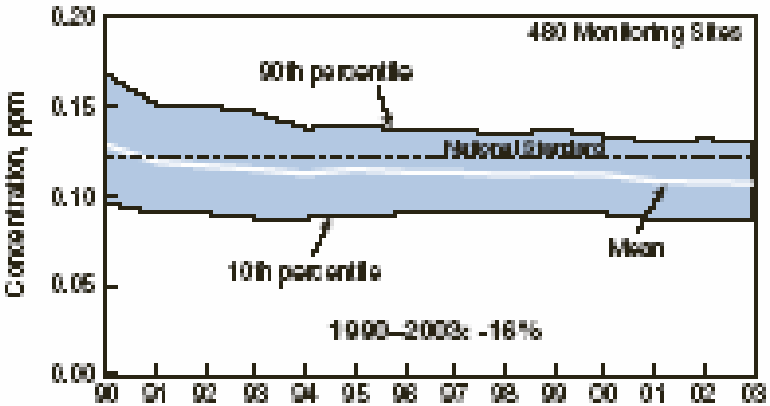


Figure 7. One-Hour Ozone Air Quality Trend, 1990–2003, Based on Running Fourth Highest Daily Maximum 1-Hour Ozone Value over 3 Years.

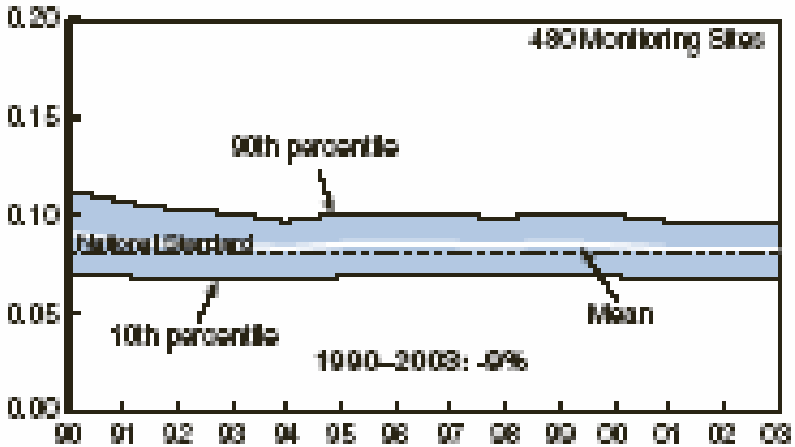


Figure 9. 8-Hour Ozone Air Quality Trend, 1990–2003, Based on 3-Year Rolling Averages of Annual Fourth Highest Daily Maximum Ozone Concentrations.

- Ozone levels are still decreasing nationwide, but the rate of decrease for 8-hour levels has slowed since 1990.

PM2.5 Designations

Timeline for PM2.5 Implementation Program

Action	Date
States/Tribes recommend designations	Feb. 2004
EPA responds with letters describing intended "modifications"	**June 15, 2004**
EPA proposes implementation rule	July 2004
EPA finalizes designations	~~**Dec. 31, 2004**~~ ~~**Dec. 15, 2004**~~ **Nov. 17, 2004**
Effective date of PM2.5 designations	Feb. 2005
EPA finalizes implementation rule	March 2005
State/Tribal plans due	Feb. 2008
Attainment dates	2010-2015

State Recommendations for Designations

- Summary
  - 116 NA counties
  - 8 partial NA counties
  - 21 counties in OH and MD recommended as NA in "options" under consideration
  - Total population of these 145 counties = 82 million
  - Presumptive metro areas associated with these counties
    - ~300 counties with 105 million population
- Website: www.epa.gov/pmdesignations
- (Rich Damberg, Larry Wallace)

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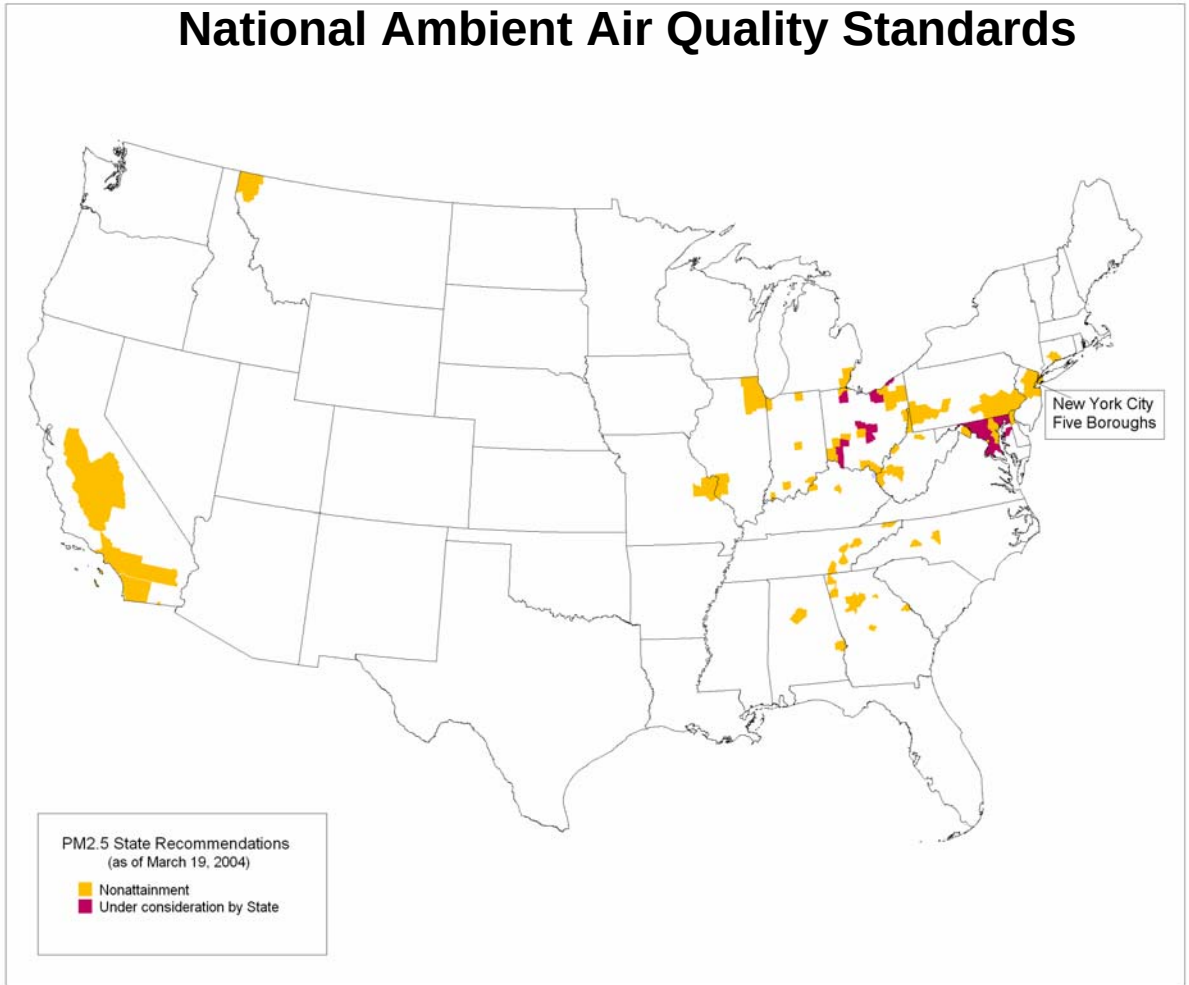
PM2.5 Designations, cont.

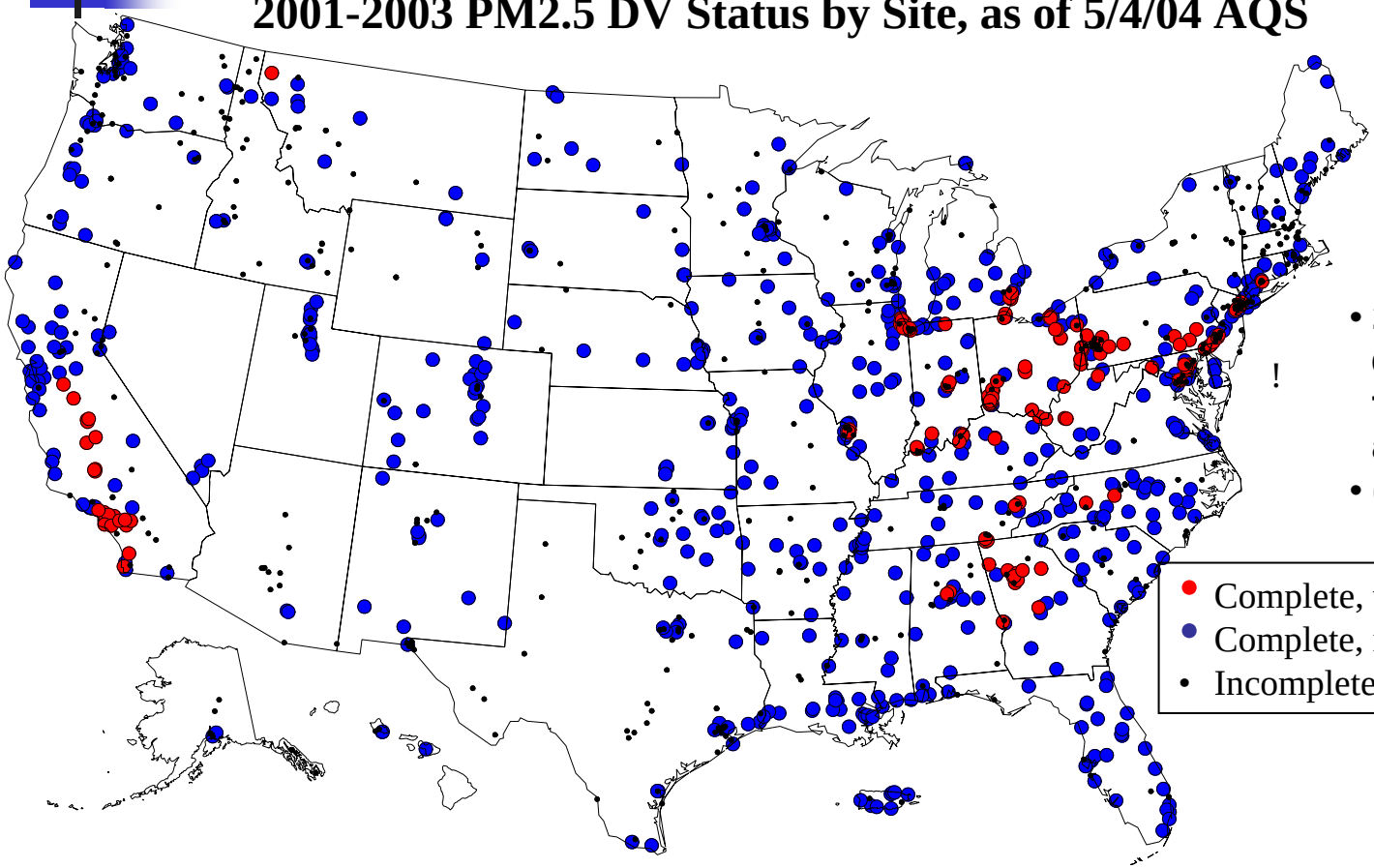
State Recommendations for Fine Particle National Ambient Air Quality Standards



Preliminary!

PM2.5 Designations, cont.

2001-2003 PM2.5 DV Status by Site, as of 5/4/04 AQS



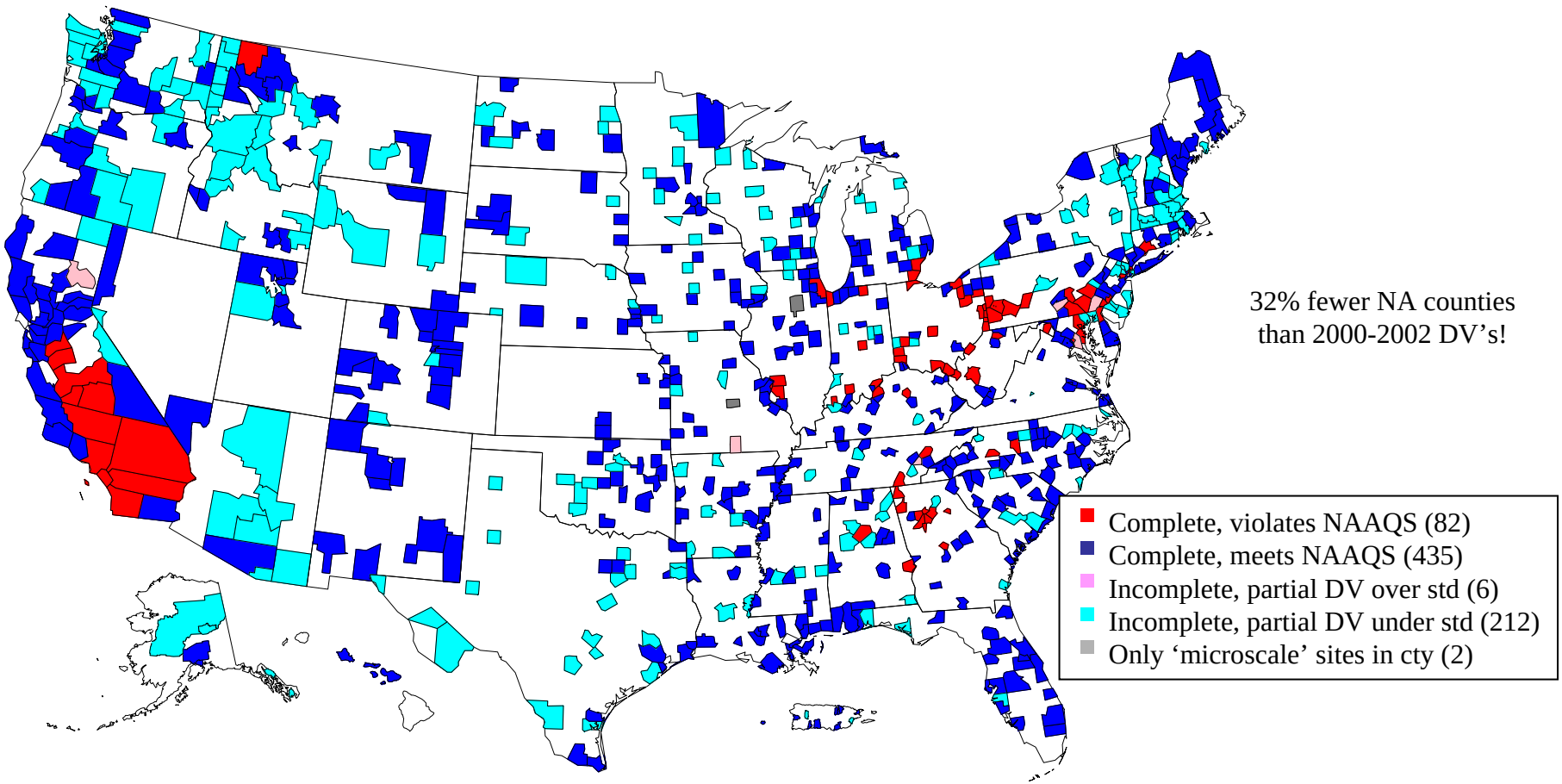
- **2003, 4th quarter data still missing for some key areas!**
- (Mark Schmidt)

- Complete, violates NAAQS (153)
- Complete, meets NAAQS (599)
- Incomplete or 'microscale' (502)

Preliminary!

PM2.5 Designations, cont.

2001-2003 PM2.5 DV Status by County, as of 5/4/04 AQS



32% fewer NA counties than 2000-2002 DV's!

PM2.5 Designations, cont.

- **<u>What is a nonattainment area?</u>**

  "... any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant."
- PM2.5 FRM data (DV's) used for determining **<u>violating</u>** ('receptor') counties.
  - Krig'ed surfaces also being considered. Interpolated surface provides estimate of DV's for unmonitored locations [Surfaces are generated with FRM (mostly urban) and IMPROVE (mostly rural) data]
- Additional 'factors' being evaluated to determine if a county is **<u>contributing</u>** to an area's PM problem.
  - Factors include emissions (SO2, NOx, direct PM, Ammonia); population, VMT,
  - Initial focus on air quality and emissions - We have developed a weighted emissions score to take multiple PM2.5 pollutants into account

PM2.5 Designations, cont.

Weighted Emissions Score

Assumptions:

- Nonattainment problems are caused by a combination of regional and local emissions
  - For purpose of designations, concentrate on counties within and adjacent to metro area (the *local* contribution)
- For purpose of developing weighted emissions metric, focus on SO2, NOx, direct carbon, and direct crustal emissions
  - Ammonia and VOC emissions indirectly included in metric. [Direct carbon and VOC highly correlated. Ammonia linked w/ SO2 and NOx]

- Weighted emissions score (aka L-score .. 'L' for local)
  - Use ambient speciation profile for urban area (from EPA speciation site) and background profile (from rural IMPROVE site) to construct 'urban increment' profile
  - Weight emissions in area according to the urban increment profile
  - Typically, urban increment profile has significantly more carbon and less sulfate than 'total' profile. [Local sources emit lots of carbon; most sulfate is regional (from power plants)] (Tesh Rao – urban increment paper in most recent Trends Report)

PM2.5 Designations, cont.

Weighted Emissions Score - example

Ambient Data	Urban Site Concentration	Rural Site Concentration	Urban Increment Concentration	% of Urban Excess Total Mass
Sulfates (ammonium nitrate)	7.7	6.2	1.5	30%
Nitrates (ammonium sulfate)	1.5	1.2	0.3	6%
Total Carbon (EC + OC*1.4)	5.9	3.0	2.9	58%
Crustal (soil formula; uses Al, Si, Ca, Fe, and Ti)	0.8	0.5	0.3	6%
Recon. Mass	15.9	10.9	5.0	

Weighted Emissions Score (L-Score)

= [(County SO2 tons / CMSA SO2 tons) *
(% sulfates of urban excess PM2.5)] {30}
+ [(County NOx tons / CMSA NOx tons) *
(% nitrates of urban excess PM2.5)] {6}
+ [(County carbon tons / CMSA carbon tons) *
(% carbon of urban excess PM2.5)] {58}
+ [(County crustal PM tons / CMSA crustal PM tons) *
(% crustal of urban excess PM2.5)] {6}

- L-scores calculated for every county in and adjacent to metro area
- Provides relative measure of importance of each county's emissions
- Adjacent counties with high L-scores should probably be included in NA designation
- Metro counties with low L-scores can potentially be excluded from NA area

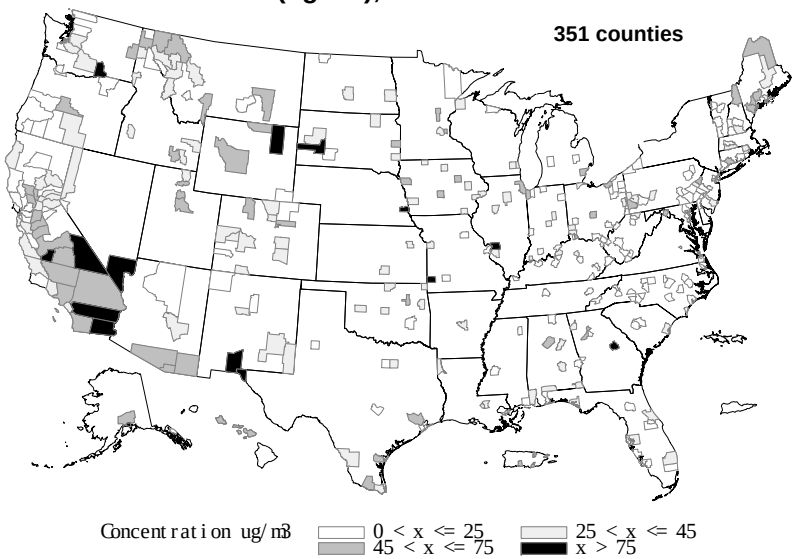
The PM Report

- Slated for release late fall this year (AQTAG, Tesh Rao)
  - To coincide with designations, NAAQS review (staff paper), ?elections?
  - Similar in style to The Ozone Report
- Will encompass PM10, PM2.5, PMcoarse (PM10-2.5), related emissions, meteorology, control programs, etc.
- Two central goals
  - Show and explain recent declines in PM2.5 levels
  - Demonstrate that PM is both a regional and local problem
- Also will...
  - Describe PM relationship to meteorology, ozone
  - Broach collection/analyses method comparability and limitations

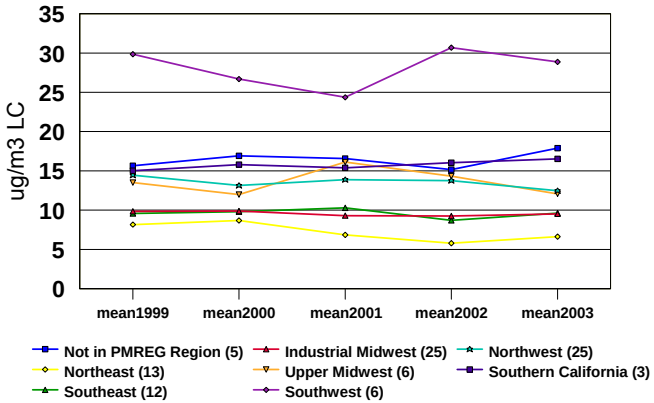
The PM Report, cont.

Example Ideas

County Max Estimated 98th Percentile 24-hour $PM_{10-2.5}$ Concentrations (ug/m3), 2000-2002



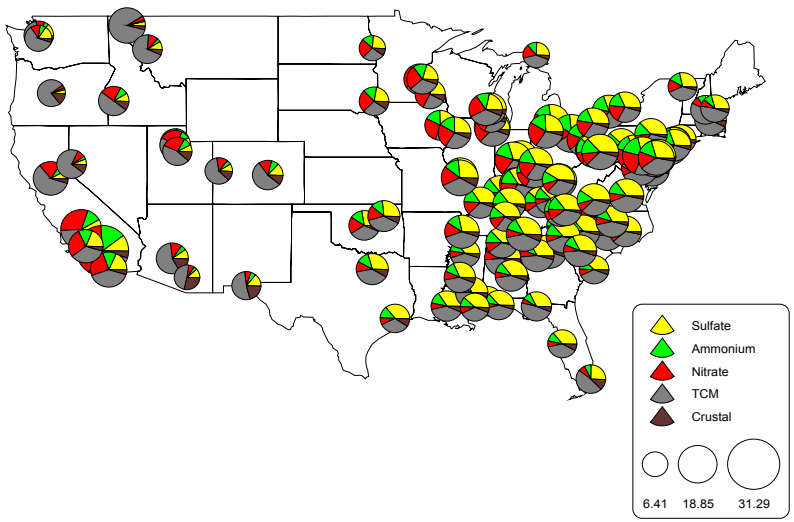
PMcoarse 1999-2003, by HEI Region (95 sites)



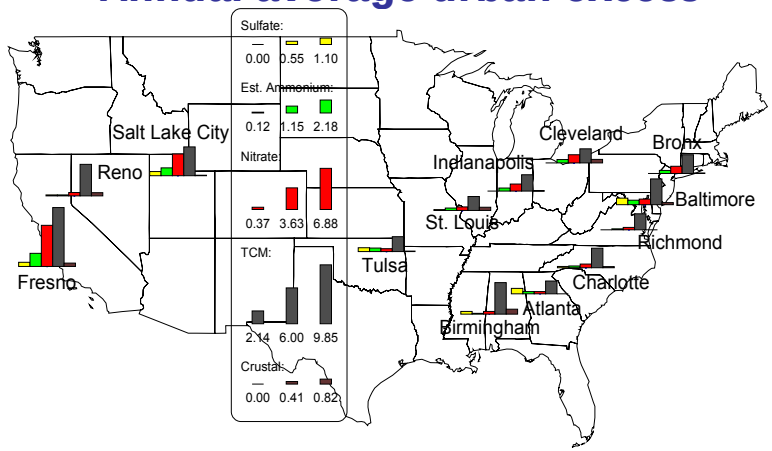
The PM Report, cont.

Example Ideas

Annual Average PM2.5 Speciation Profiles for Urban Sites
(April 2002 through March 2003 Data)



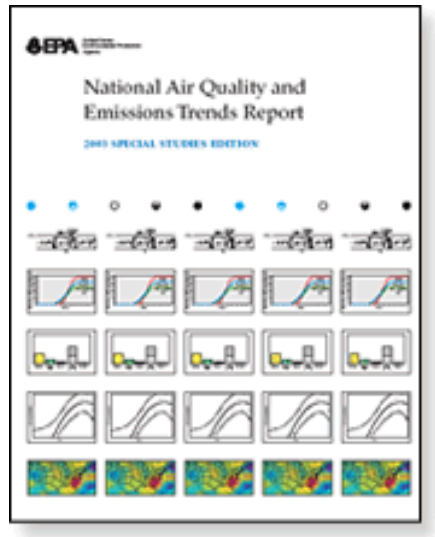
Annual average urban excess



- Specific urban sites matched with rural sites to estimate urban excess
- TCM is the major driver of urban excess everywhere
- Excess nitrates play a role in the Midwest and West
- Sulfates show very little impact on urban excess, confirming the regional nature of the pollutant

Trends Reports

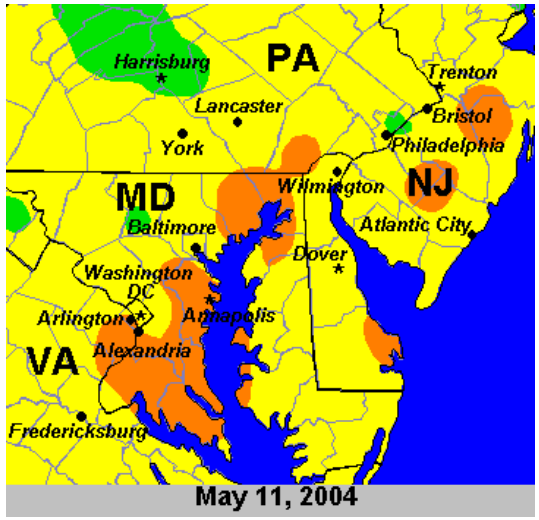
- Last released September, 2003
  - http://epa.gov/air/aqtrnd03/toc.html
  - Includes Special Studies section
    - Impact of April 2001 Asian Dust Event on Particulate Matter Concentrations in the United States
    - Chemical Speciation of PM2.5 in Urban and Rural Areas
    - Trends in Monitored Concentrations of Carbon Monoxide
    - Cumulative Ozone Exceedances — A Measure of Current Year Ozone Levels Compared to Historical Trends
    - Characterization of National Spatial Variation
    - Development of a New Reporting Technique for Air Quality
- New philosophy (re Trends Report) is...
  - More technical, more policy-relevant
  - More pollutant-specific reports
    - E.g., Ozone, PM
  - Web data posted annually, but hardcopy report not

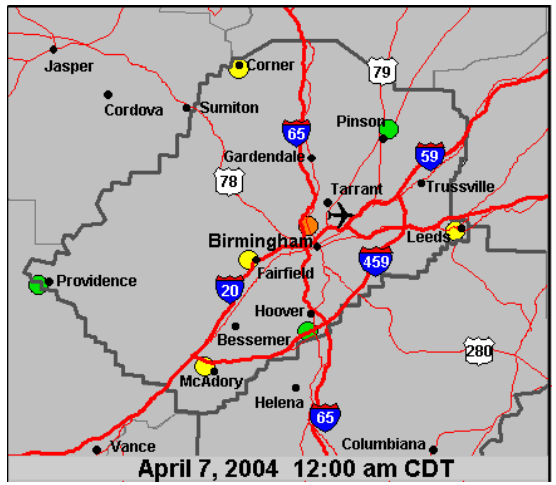


AIRNow

New York City, NY
Air Quality Forecast for Saturday, 22 May 2004
PM2.5 - Moderate

Unusually sensitive people should consider reducing prolonged or heavy exertion.





- Continuous pollution data used for public awareness
- www.epa.gov/airnow
- Currently, AIRNow site shows area forecasts, maps of AQI levels, maps of average/peak concentrations, map of cities experiencing action days, and visibility webcams,
  - Ozone in production for several years
  - Second year for PM
- Planned enhancement is combined PM2.5/Ozone AQI maps
- Issue: AIRNow input PM2.5 data is mixed-bag of ‘raw’, ‘corrected’ / ‘FRM-like’; doesn’t always match AQS data!!
  - (Tim Hanley)

Clean Air Interstate Rule (IAQR, transport rule)

- Key analyses for proposed rule is speciated modeled attainment test (SMAT)
- Ambient data is combined with model output to estimate future year concentrations (design values)
  - Relative Reduction Factor = model predicted (%) change in pollutant(s) from base year to future year
  - Base year DV * Relative Reduction Factor = Future year DV
  - SMAT for PM2.5 uses all of the PM2.5 component species (from ESpN)
- Early model applications for PM2.5 used an "unspeciated" attainment test
- The Clear Skies and CAIR analyses have used the "speciated" modeled attainment test (SMAT)
  - Modeled % reduction for **each** of the PM 2.5 species is applied to the ambient measurements (by quarter)
  - SMAT shows larger percent $PM_{2.5}$ reduction from current base to future year
  - More influence from the largest ambient components (sulfate and organic carbon)
  - Less influence from smaller components (crustal, elemental carbon, and in some areas nitrate)
- Fewer nonattainment counties in the future compared to unspeciated modeled attainment test

Clean Air Interstate Rule, cont.

Example Calculation for Quarter 2 in Atlanta (2020)

"Unspeciated" Modeled Attainment Test

	Ambient Data April-June (ug/m3)	Modeled RRF	2020 DV (ug/m3)
PM2.5	17.67	0.970	**17.14**

Speciated Modeled Attainment Test

	Ambient Data April-June (ug/m3)	Modeled RRF	2020 DV (ug/m3)
Sulfate	7.31	0.88	6.43
Nitrate	1.02	0.92	0.94
EC	0.89	0.63	0.56
OC	6.05	0.94	5.69
Crustal	1.30	1.29	1.68
Unatributed	1.10	1.00	1.10
PM2.5	17.67	----	**16.40**

-Model severely overpredicts the crustal component which is increasing in the future (29% in this example)

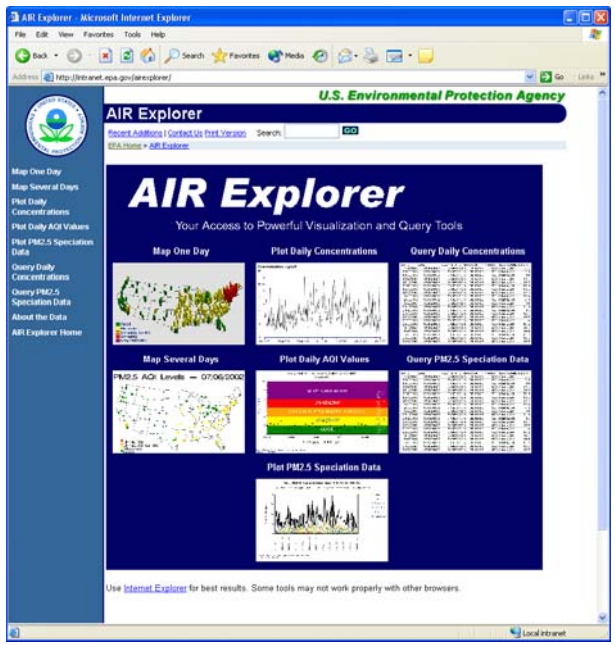
-One of the main causes of higher future year design values in the "unspeciated" example

Monitoring & Analyses – Data Delivery / Analyses Tools

- Data Utilization
- Data Delivery / Analyses Tools
  - AIR Explorer
  - CIRA Air Toxics Archive Tool
  - AMDAS
- Metadata & More-data
- Monitoring Updates & Regulatory Changes

AIR Explorer

Introducing Air Explorer



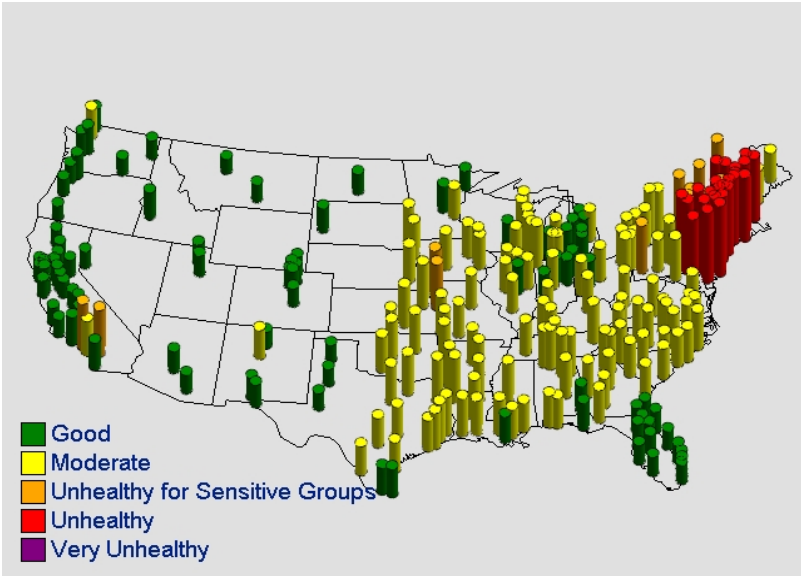
- Powerful Web-driven analytical tools
- Generates output dynamically (on-the-fly)
- Currently available on EPA's Intranet
- Plan to provide broader access later in 2004

AIR Explorer

- Challenge –
  - Make it easier to
    - Respond to typical data analysis requests
    - Perform routine analyses
    - Provide broad access to analytical tools
    - (Let IMG concentrate on general data access & data warehousing)
- Action –
  - Build Dynamic Web Application
  - Use Existing SAS Technology
- Result -
  - Powerful analytical tools
  - Interactive, portable results
  - Exploratory analysis capabilities

AIR Explorer

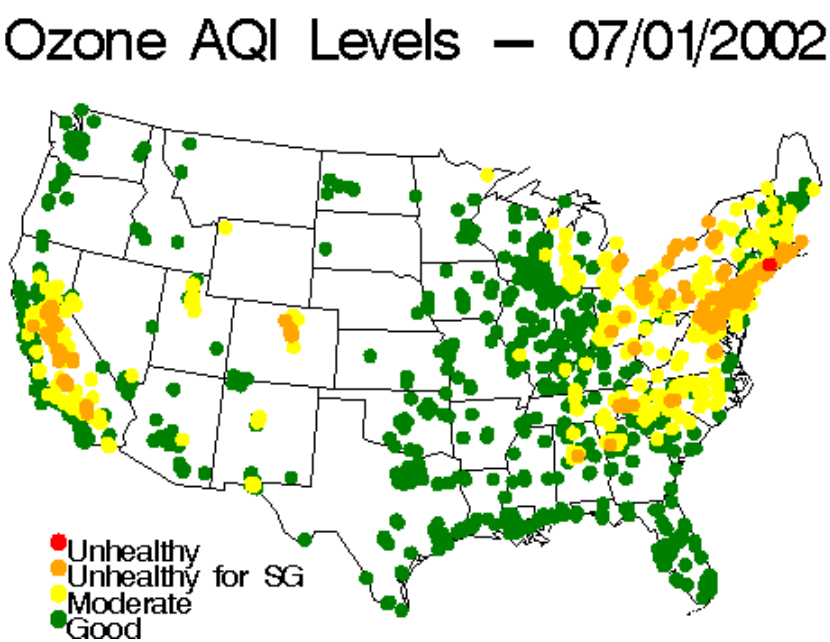
PM2.5 AQI Values by MSA on 07/07/2002

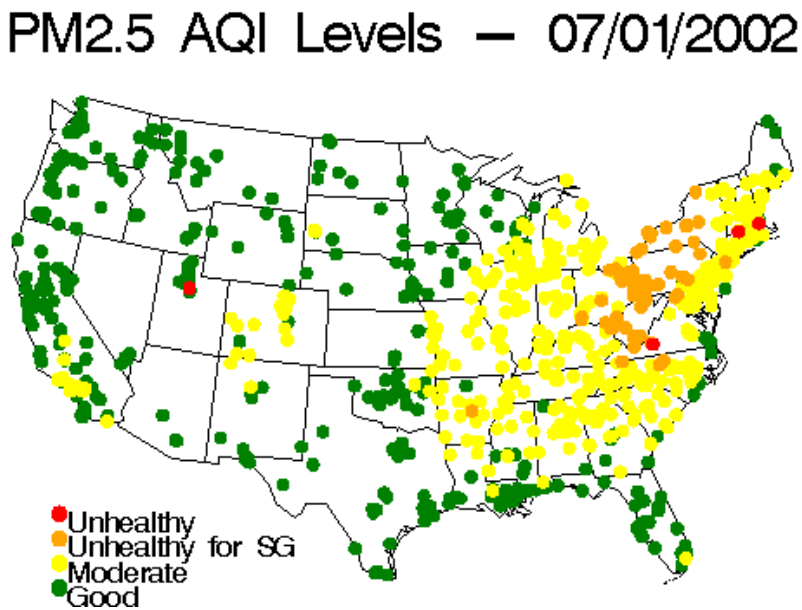


- You can map daily AQI levels for any pollutant, any day.
- Rotate, zoom, and other interactive features available

AIR Explorer

- You can view daily animations for multiple pollutants for any time period

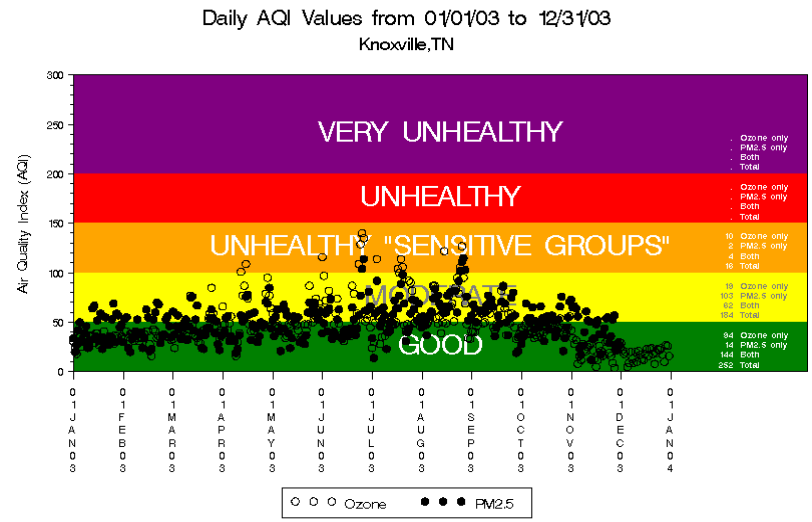




AIR Explorer

- You can plot daily PM2.5 and ozone AQI values for any city, any time period

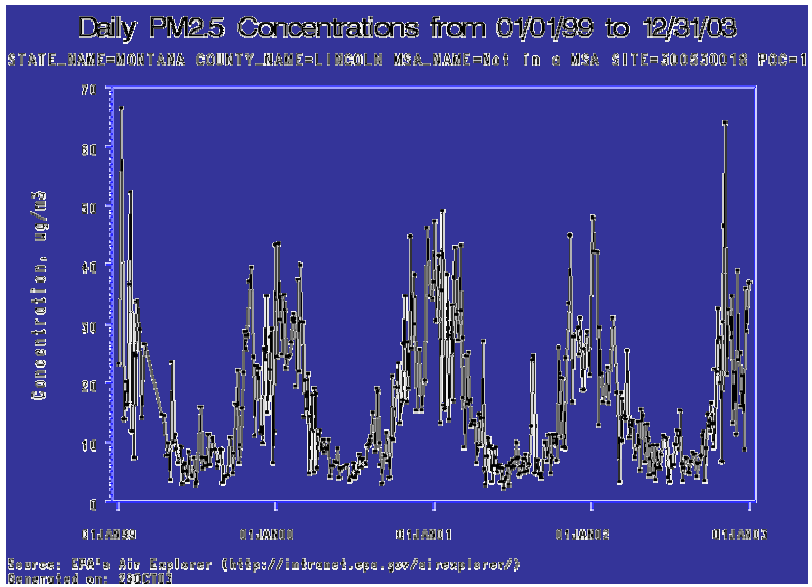
PM2.5 AQI Values by MSA on 07/07/2002



Source: EPA's Air Explorer (http://intranet.epa.gov/airexplorer/)
Generated on: 05FEB04

AIR Explorer

PM2.5 Values by MSA on 07/07/2002



- You can plot daily concentrations for any city, any pollutant, any time period

AIR Explorer

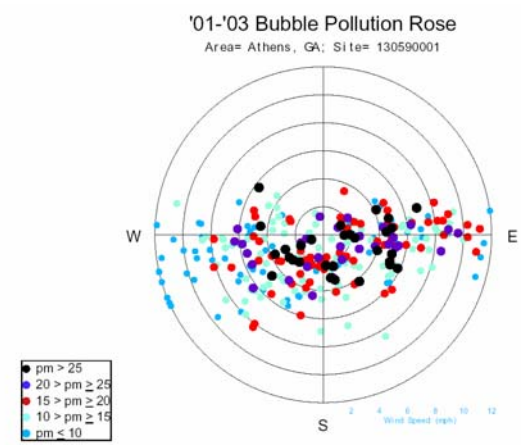
PM2.5 AQI Values by MSA on 07/07/2002

DATE	SITE	POC	STATE_NAI	COUNTY_N	MSA	MSA_NAME	PM2.5 F
1/3/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	7.5
1/12/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	8.1
1/15/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	11
1/18/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	12.5
1/21/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	13.7
1/24/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	12.1
1/27/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	14.3
1/30/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	12.7
2/2/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	13.4
2/5/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	7.1
2/8/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	11
2/11/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	11.1
2/14/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	18
2/17/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	10.7
2/20/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	19.8
2/23/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	6.4
2/26/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	19.2
3/1/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	10.5
3/4/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	14.4
3/7/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	10.7
3/10/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	10.3
3/13/2003	130890002	5	GEORGIA	DE KALB	520	Atlanta,GA	18.8

- You can download daily concentrations for any city, any pollutant, any time period

AIR Explorer

- Benefits
  - Less time generating results
  - More time interpreting “& sharing results
  - Broad access to tools
  - Only need a Web browser
- Currently available at http://intranet.epa.gov/airexplorer/
- Future
  - Providing broader access later this year (internet)
  - Improving existing tools
  - Designing new tools for specific needs
- (David Mintz)



Air Toxics Archive Tool

- Web product provides access to air toxics data ‘archive’
  - Compilation of historic toxics data from variety of sources
  - Not all data in AQS
- All ‘new’ toxics data supposed to go into AQS!
- (Fred Dimmick)

(Example screen shots)

Air Toxics Archive Tool, cont.

Address http://vista.cira.colostate.edu/atda/

Environmental Protection Agency's
Air Toxics Data Archive

- Home
- About
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- Site Map
- Contact Us
- Help
- Links

For best results, please use:
Internet Explorer 5 (or higher)
Netscape 6 (or higher)
more info...

Welcome to the Air Toxics Data Archive...

The purpose of this web site is to provide online access to data about toxic substances in the air. Analyses of these data will provide information about the spatial patterns, temporal profile, and general characteristics of various air toxic compounds.

The ATDA (Air Toxics Data Archive) web site is sponsored by the STAPPA/ALAPCO/USEPA Air Toxics Monitoring Subcommittee and is part of the ongoing work to support the deployment of a national air toxics monitoring network.

Website Features

Air Toxics Database
Use our powerful Query Wizard to query the Air Toxics Archive Database. Search by monitoring program, pollutant, monitoring site/location, and date range. Specify various formatting options and choose to receive your data in a "smart grid", HTML table, or ASCII text file. Power users can also use the **Ad Hoc Query Tool** for directly querying the database using SQL statements.

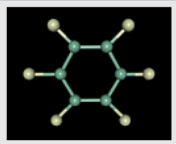
Air Toxics Metadata
Browse the collection of metadata available for the Air Toxics Archive. The following metadata information is currently available:
Programs - Sites - Pollutants - Graphical Browser

Air Toxics Project Reports
View various reports about the data in the archive and information derived from the data. Browse numerous statistical analyses and summaries, as well as monitoring

Our Partners
STAPPA/ALAPCO
Environmental Protection Agency

Featured Links
- About Air Toxics
- Air Toxics Methods
- Air Toxics Index
- EPA Air Toxics Website
- Clean Air Act
- National Air Toxics Assessment

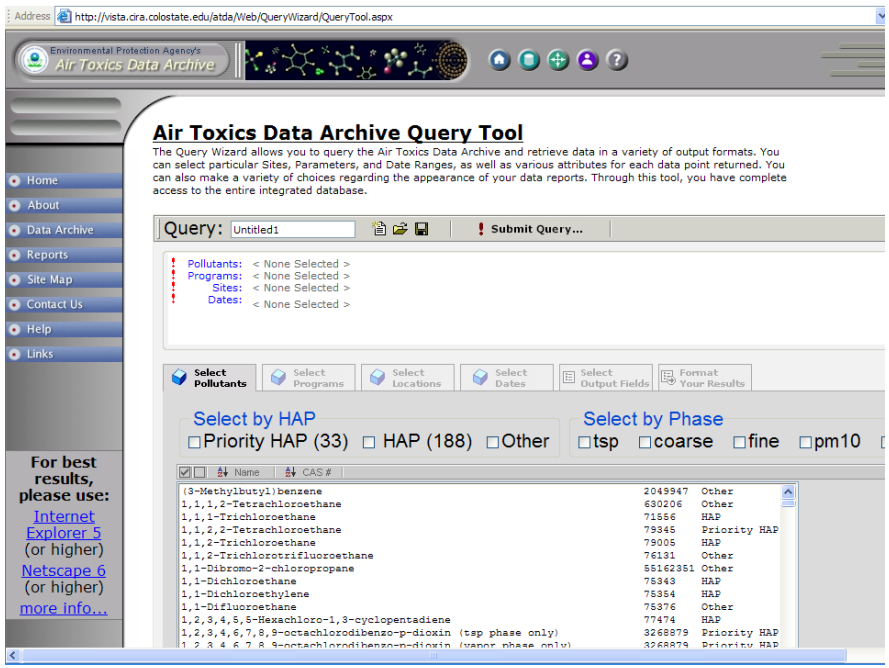
Featured Substance

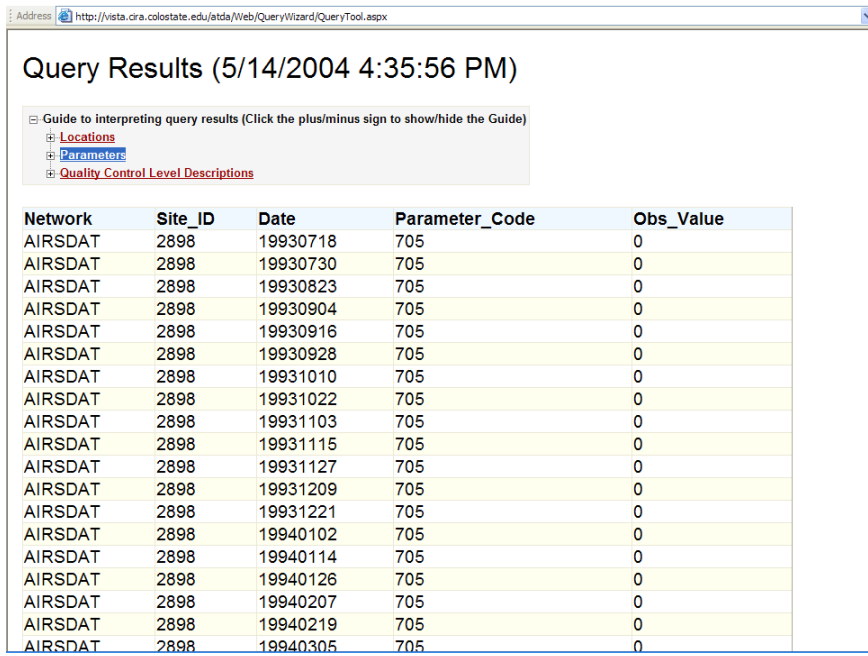


Benzene
CAS: 71-43-2
HAP: Yes

(Example screen shots)

Air Toxics Archive Tool, cont.

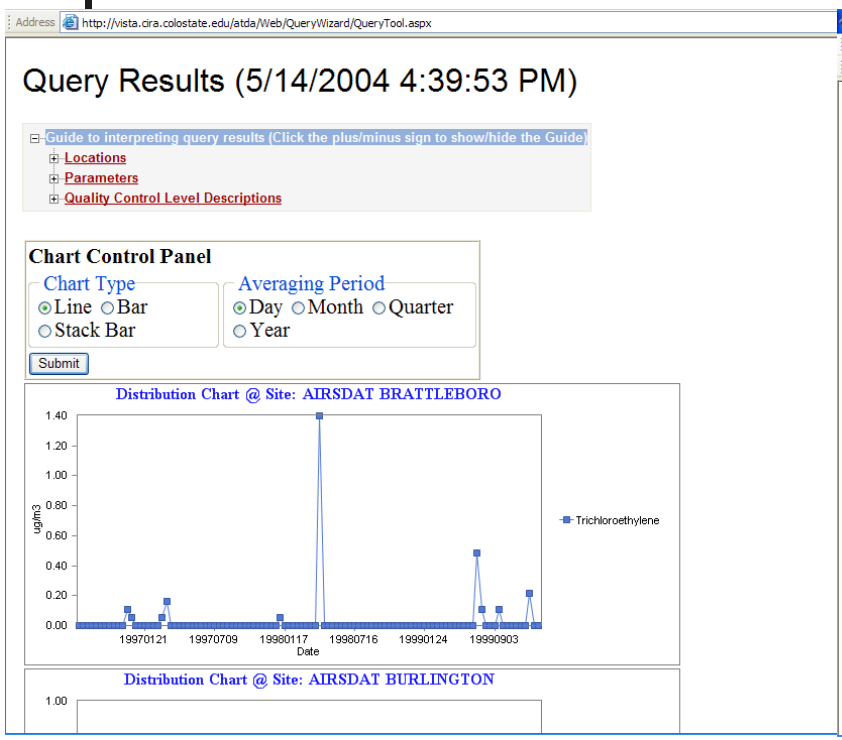




Network	Site_ID	Date	Parameter_Code	Obs_Value
AIRSDAT	2898	19930718	705	0
AIRSDAT	2898	19930730	705	0
AIRSDAT	2898	19930823	705	0
AIRSDAT	2898	19930904	705	0
AIRSDAT	2898	19930916	705	0
AIRSDAT	2898	19930928	705	0
AIRSDAT	2898	19931010	705	0
AIRSDAT	2898	19931022	705	0
AIRSDAT	2898	19931103	705	0
AIRSDAT	2898	19931115	705	0
AIRSDAT	2898	19931127	705	0
AIRSDAT	2898	19931209	705	0
AIRSDAT	2898	19931221	705	0
AIRSDAT	2898	19940102	705	0
AIRSDAT	2898	19940114	705	0
AIRSDAT	2898	19940126	705	0
AIRSDAT	2898	19940207	705	0
AIRSDAT	2898	19940219	705	0
AIRSDAT	2898	19940305	705	0

(Example screen shots)

Air Toxics Archive Tool, cont.



(Example screen shots)

Air Toxics Archive Tool, cont.

Address http://vista.cira.colostate.edu/atda/Web/Metadata/ProgramList.aspx

tection Agency's Data Archive

Programs - Sites - Pollutants - Graphical Browser Help

Data	Code	Name	State	County	Param
Data	US02_327	1978 HOUSTON OXIDANT MODELIN STUDY. VOL. II. DATA BASE GUIDE	TX		VOCs
Data	US02_326	1982 ATLANTA OZONE FORMATION STUDY	GA		VOCs
Data	US02_322	1982 LINCOLN TUNNEL STUDY	NY		VOCs
Data	US02_302	1986 Nonmethane Organic Compounds Monitoring	TX; PA; OK; NY; NJ; MD; IL; GA; DC; CT; CO; AL		VOCs
Data	US02_339	1991 Lake Michigan Ozone Study	MI		
Data	GA02	1994 Chatham County Air Toxics Study; conducted to gather information on air quality and its relationship to human health in Chatham Co.	GA	Chatham	VOCs; aldehyd metals
Data	GA03	1996 Brunswick County Air Toxics Study	GA	Glynn	VOCs; aldehyd metals
Data	US02_273	2;4-Dinitrophenylhydrazine-Coated Florisil Sampling Cartridges for the Determination of Formaldehyde in Air	MI		VOCs
Data	US02_252	A Cryogenic Preconcentration - Direct FID (PDFID) Method	VA; TX; TN; PA; OH; NC; MO; ME;		VOCs

(Example screen shots)

Air Toxics Archive Tool, cont.

Address http://vista.cira.colostate.edu/atda/Web/Tour/ATDATour_files/frame.htm

1 **Program Metadata Page**
2 **Site Metadata Page**
3 **Pollutant Metadata Page**
4 **Metadata Browser - General**
5 **Metadata Browser - Example**
6 **Metadata Browser – Future Plans**
7 **Site Analysis Tool (beta version)**

Program Metadata Page

Programs - Sites - Pollutants - Graphical Browser

Data	Code	Name	State
Data	US02_327	1978 HOUSTON OXIDANT MO STUDY. VOL. II. DATA BASE GUIDE	TX
Data	US02_326	1982 ATLANTA OZONE FO N STUDY	GA
Data	US02_322	198	NY
Data	US_302	toring	TX; PA; OK; NY; NJ; MD; IL; GA; DC; CT; CO; AL
Data	US02_3	1991 Lake Michigan Ozone Study	MI
Data	GA02	Chatham County Air Toxics Study; conduct lationship to human health in Chatham Co	GA
Data	GA03		GA
Data	US02_273	Florisil Sampling Cartridges for the Determination of Formal	MI
Data	US02_252	A Cryogenic Preconcentration - Direct FID (PDFID) Method for Measurement of NMOC in Ambient Air	VA; TX; TN; PA; OH; NC; MO; ME; MA; LA; IN; GA; FL; DC; AL
Data	US02_312	A Cryogenic Trap/Porous Polymer Sampling Technique for the Quantitative Determination of Ambient Volitile Organic Compound Concentrations	PA; CA
Data	US02_222	A Kilometer Pathlength Fourier-Transform Infrared System for the Study of Trace Pollutants in Ambient and Synthetic Atmospheres	CA
Data	US02_303	A Long-path Infra-red Study of Los Angeles Smog	CA
Data	US02_283	A Multisorbent Sampler for Volatile Organic Compounds in Indoor Air	
Data	US02_96	A Sensitive Technique for Measurement of Benzene and Alkylbenzenes in Air	CA
Data	US02_120	Absolute Determination of Atmospheric Halocarbons by Gas Phase Coulometry	NJ

Click on these hyperlinks to navigate to a different metadata page.

Click on a column name to sort the table by this column.

Click on the "**Data**" hyperlink to access a program's data

Outline

Slide 1 of 7

Slide

(Example screen shots)

Air Toxics Archive Tool, cont.

Address http://vista.cira.colostate.edu/atda/Web/Metadata/SiteList.aspx

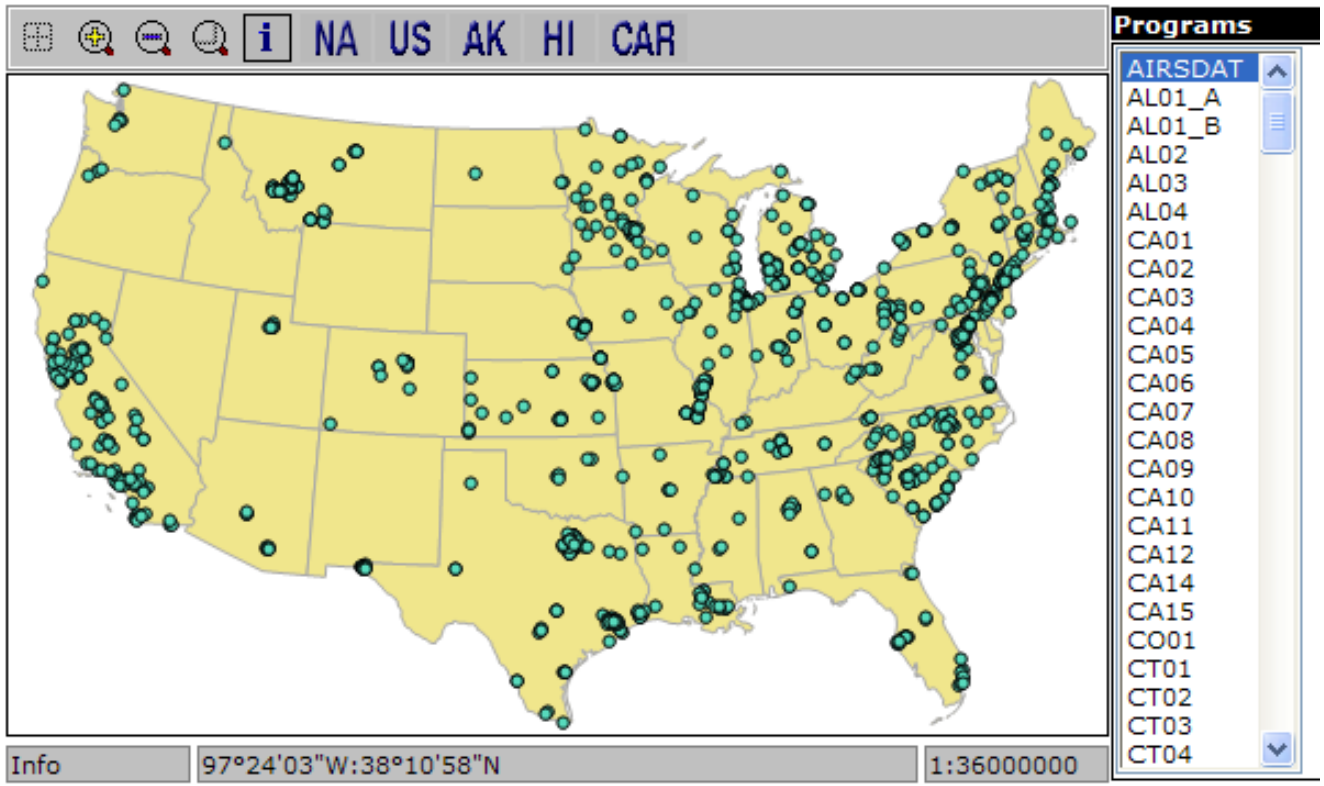
ction Agency's
ata Archive

Programs - Sites - Pollutants - Graphical Browser Help

Data	Data	Map	Code	Name	Program	State	County	Latitude
Data	Analysis	Map	OH01.NEDOXERX	.15 mile W. Xerxes and Mills R	OH01	OH	Lorain County	41.38805
Data	Analysis	Map	450910006	.York Co	AIRSDAT	SC	York County	34.935556
Data	Analysis	Map	450910006	.York Co	NC01	SC	York County	34.935556
Data	Analysis	Map	TX01.1.1	1.1	TX01	TX	Brazoria County	29.080085
Data	Analysis	Map	TX01.1.2	1.2	TX01	TX	Brazoria County	29.079256
Data	Analysis	Map	TX01.1.3	1.3	TX01	TX	Brazoria County	29.063245
Data	Analysis	Map	TX01.1.4	1.4	TX01	TX	Brazoria County	29.063401
Data	Analysis	Map	TX01.1.5	1.5	TX01	TX	Brazoria County	29.07195
Data	Analysis	Map	TX01.10.1	10.1	TX01	TX	Brazoria County	29.072002
Data	Analysis	Map	TX01.10.2	10.2	TX01	TX	Brazoria County	29.069825
Data	Analysis	Map	TX01.10.3	10.3	TX01	TX	Brazoria County	29.074023
Data	Analysis	Map	TX01.10.4	10.4	TX01	TX	Brazoria County	29.07936

(Example screen shots)

Air Toxics Archive Tool, cont.



Selected Programs

Program Code	Program Name	County	Agency	Parameters	Daterange
AIRSDAT	AIRS AIR QUALITY DATA	All	United States Enviromental Protection Agency	Too Many To List	Ongoing

(Example screen shots)

Air Toxics Archive Tool, cont.

Address http://vista.cira.colostate.edu/atda/Web/General/Reports.aspx

- Home
- About
- Data Archive
- Reports
- Site Map
- Contact Us
- Help
- Links

For best results, please use:
Internet Explorer 5 (or higher)
Netscape 6 (or higher)
more info...

Project Reports

The Air Toxics Data Archive project has produced a number of reports concerning various the archive itself and information derived from the data within the archive.

Air Toxics Data Archive Table of Contents

A detailed summary of the contents of the Air Toxics Data Archive.

Air Toxics Monitoring Data: Analyses and Network Design Recommendations

The final report from Battelle Memorial Institute and Sonoma Technologies, Incorporated. This report includes detailed discussions of numerous statistical analyses and the network design recommendations derived from the analyses. Due to the size of the report, it has been subdivided into the following sections:

- **Technical Executive Summary**
- **Opening Letter through Section 2.2.4.1**
- **Section 2.2.4.2 through Section 2.5**
- **Section 3 through Section 4**
- **Appendix A**
- **Appendix B Table of Contents through Appendix B.1**
- **Appendix B.2 through Appendix B.3**
- **Appendix B.4 through Appendix B.5**

Our Partners

STAPPA/ALAPCO
Environmental Protection Agency

Featured Links

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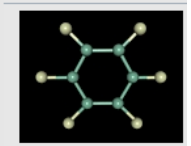
- Air Toxics Index
- EPA Air Toxics Website
- Clean Air Act
- National Air Toxics Assessment

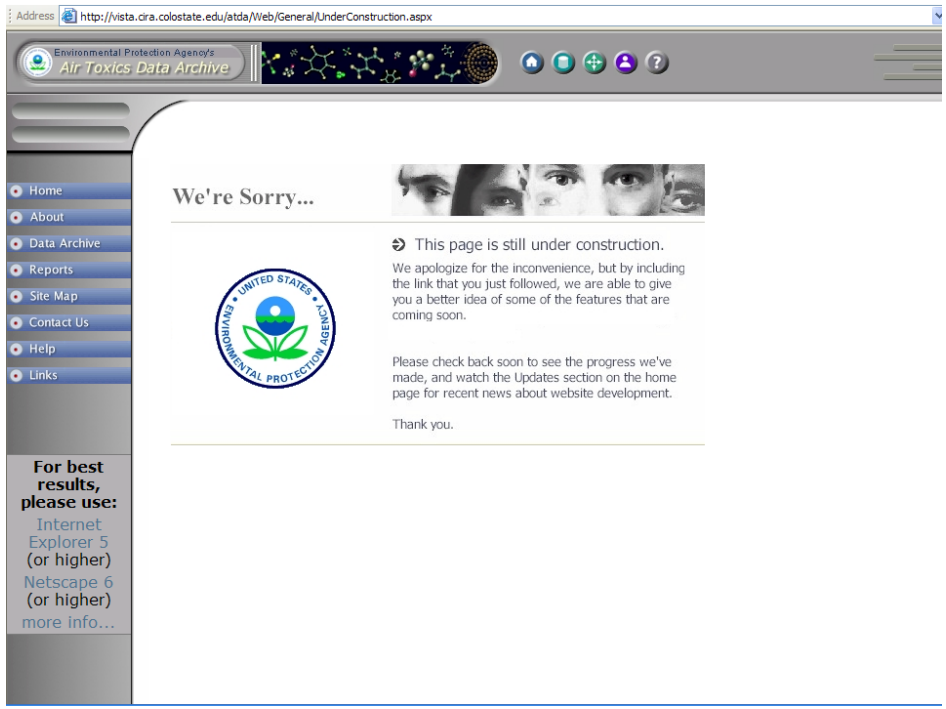
Featured Substance



Benzene
CAS: 71-43-2
HAP: Yes
Priority HAP: Yes
Formula: C6H6
Molecular Wgt: 78.11
# of Carbon atoms: 6

Air Toxics Archive Tool, cont.

- Work in progress!
- (Fred Dimmick)



AMDAS

- Ambient Monitoring Data Analyses System
- Originally named PAMSDAS (PAMS Data Analyses System)
  - Reconfigured to handle multiple programs/pollutants
- Runs on SPLUS
  - Menu-driven add-on component
  - Users can stick to AMDAS menus or use full power of S-Plus software
  - Would not run on newest version of S-Plus (major rewrite)
- Current contract to rewrite AMDAS to run on new SPLUS
  - LADCO running contract
  - ETA late summer / fall
  - Enhancements forthcoming

AMDAS, cont.

- Features:
  - Can import ASCII files, AQS transaction files, VOCDat files, etc.
  - Data management facility (inc. browser)
  - Integrated data dictionaries for PAMS target parameters, PM2.5 speciation, and toxics
  - Pollution rose plots
  - Time series plots
  - Fingerprint plots
  - Before/After; Site-to-Site; or Year-to-Year comparison plots & statistics
  - Summary facility
  - Trends analyses plots
- Will be posted to web
- Training likely
- (Donna Kenski, Mark Schmidt)

Monitoring & Analyses Topics

- Data Utilization
- Data Access / Analyses Tools
- AQS Metadata and More-data
  - Site and Monitor Metadata
  - Speciation Blanks
  - IMPROVE, CASTNet, etc.
- Monitoring Updates & Regulatory Changes

Site and Monitor Metadata

- Researchers need reliable demographic and socio-economic information associated with pollutant concentration data!
  - Example problem - **What is the state of urbanization in the local vicinity of PM 2.5 and PM 10 monitors?**
    - AQS Location Setting field not completely filled out. Many data users use MSA code as surrogate for 'urban'.
    - Thousands of PM2.5 and PM10 monitors are located across the entire U.S.
    - The U.S. has been rapidly urbanizing. Urbanization brings with it an increase in industry, infrastructure, and higher population densities which change the character of the landscape.
    - The landscapes around monitors may have changed dramatically after initial placement and thus may be mis-labeled in the AQS.
    - Urbanization is not a discrete phenomena. There are few clear-cut boundaries between urban and non-urban areas. Urbanization can range from almost completely built environments in inner cities, to suburban sprawl and small towns. To appropriately quantify urbanization, a measure of the degree of urbanization must be developed

Site and Monitor Metadata

- What is the state of urbanization in the local vicinity of PM 2.5 and PM 10 monitors?
  - Attempt to Calculate Urbanization Index
    - What are the characteristics of urbanization?
      - Industrialization
      - Infrastructure
      - Population density
  - In-house OAQPS (AQTAG/ISEG) Cooperative Study
  - (Tesh Rao, Janet Cakir)

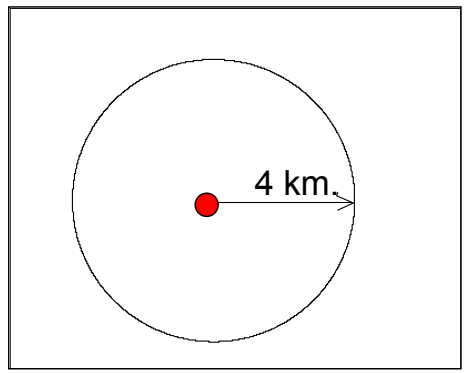
Site and Monitor Metadata

GIS can be used to quantify the characteristics of Urbanization around PM 2.5 and PM 10 monitors

- A circle (4 km.) can be used to define a region of local influence on each PM monitor. With the use of GIS (Geographic Information Systems) technology, the characteristics of urbanization can be surveyed and quantified within the boundaries of each circle around each PM monitor.

Data used in GIS analysis

- Industrialization:
  - Number of industrial boilers
- Infrastructure:
  - Total length of major highways
- Population density:
  - US Census Bureau Tract level population counts.



● = Monitor 1

Site and Monitor Metadata

The GIS surveys are then used to develop an index of urbanization

- After the survey of the total number of boilers, people (residents), and total length of highway within 4 km. is performed, the results are normalized to remove the influence of units of measurement.

Raw GIS surveyed Data

monitorID	boilers	highway	population
1	4	60	30,000

$$Z = (x - \mu)/\sigma$$

Normalized GIS surveyed data

monitorID	boilers	highway	population
1	.7	.8	.65

Z = normalized value
X = measured value
μ = mean of all measured values
σ = standard deviation of all measured values

AQTAG/ISEG Cooperative Study

Site and Monitor Metadata

Normalized values can be aggregated to create an urbanization index

Normalized GIS surveyed data

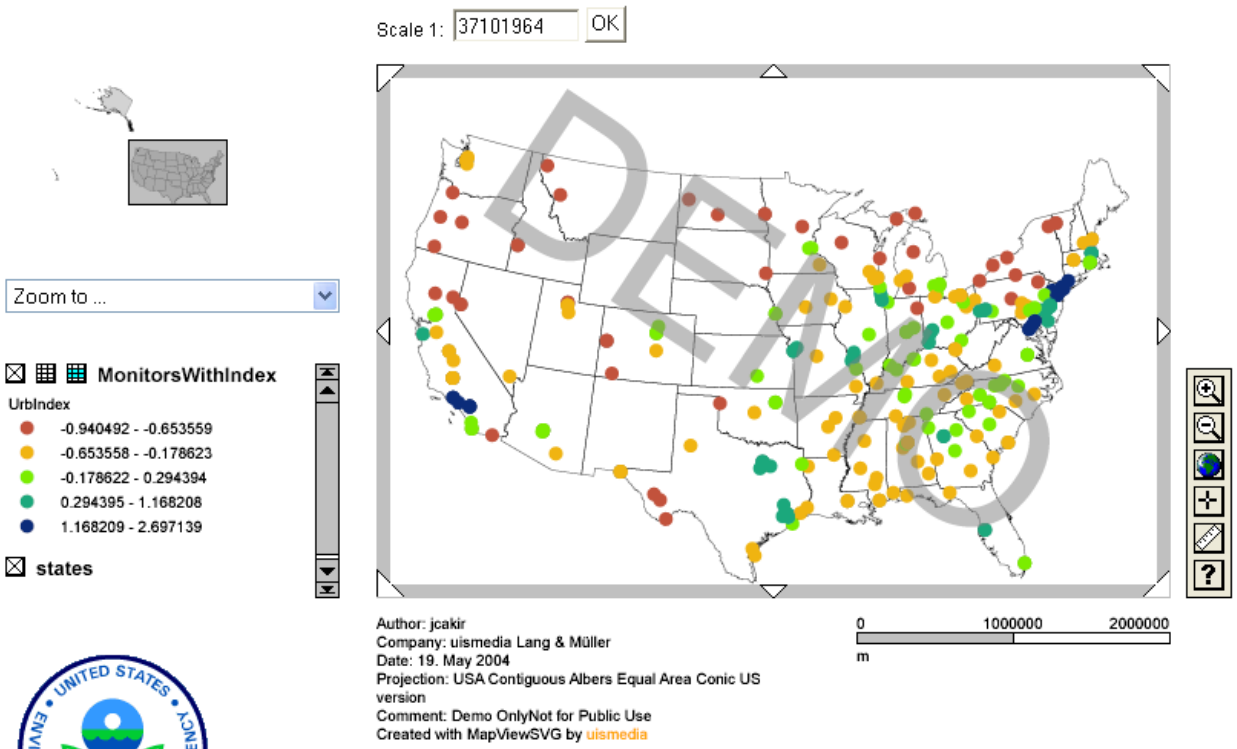
monitorID	boilers	highway	population	Index
1	.7	.8	.65	2.15

- **The index created from normalized values allows a comparison of the degree of urbanization at any location across the U.S.**

Site and Monitor Metadata

Maps can then be created to view the spatial patterns of the locations of monitors and their associated degree of urbanization.

Interactive Web Delivery of Monitor Information



Site and Monitor Metadata

Links on web-delivered map allow user to view an aerial photograph of the monitor

Site and Monitor Metadata

- We need an extensive evaluation of AQS site and monitor fields!
  - By....
    - Reporting organizations
    - ITPID
    - EMAD
    - ORD
    - GIS specialists (contractors)
- Maybe consider revamping AQS site and monitor tables (or at least add new fields)
- Another example – Area classification and associated population
  - Need to add 2003 OMB classification codes
    - CBSA (core-based statistical area)...similar to MSA; CSA (Combined Statistical Area)... similar to CMSA
  - 2000 Census population data not totally loaded into AQS

Speciation Blanks

- ‘Speciation filter blanks (trip, field, lab) analyzed for target parameters for QA uses ... contamination, artifacts
- IMPROVE speciation program corrects its concentration data by subtracting blank results
- EPA speciation network (ESpN) including Trends (STN) component does <u>not</u> do blank correction for AQS data inputs
- Most EMAD data users <u>do</u> use (self-constructed) corrected carbon data
- Blank data access has, to date, relied on availability from data collection agency (e.g., RTI)
- New AQS data structure has been created for blanks!
  - Will be in production soon (summer)
  - RTI will load historic blank data shortly thereafter

IMPROVE, CASTNet, etc.

- ‘IMPROVE and CASTNet data currently not present in AQS
  - Reasons:
    - IMPROVE program administrators & data users did not want data loaded without proper qualifiers
      - Specifically, data-point specific ‘uncertainties’ and detection limits
    - CASTnet data (ozone, deposition) not allowed in due to possible misuse. [Ozone data not collected per NAAQS quality assurance guidelines.]
    - No one made it a priority (MQAG?, IMG?, AQTAG?)
  - Reconsideration being given
    - AQS is ready (uncertainty & MDL fields will accommodate)
    - CASTNet ozone data could be specially categorized
    - Tesh Rao (EMAD-AQTAG) stepping up to the plate
  - Benefit – AQS is one-stop shop for data!
- Other program data? Meteorological data?

Monitoring & Analyses Topics

- Data Utilization
- Data Access / Analyses Tools
- Metadata and More-Data
- Monitoring Updates & Regulatory Changes
  - Speciation
  - Toxics
  - PAMS
  - Trace Gases
  - PM: coarse, continuous

Speciation

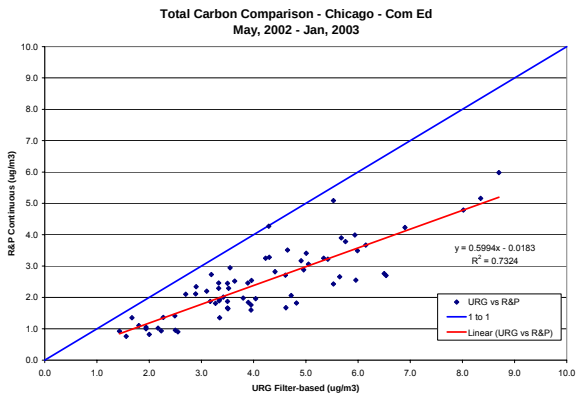
- Blank data to AQS
- Improved carbon analyses techniques
- Evaluation (and significant findings) of ESpN vs. FRM vs. IMPROVE vs. 'truth' (what we breathe)
- Siting evaluation (move some sites to more critical locations)
- Continuous carbon, sulfate, & nitrate instruments
  - Promising but still experimental
  - (Jim Homolya)
- Enhancements to data validation tool (SVDAT)

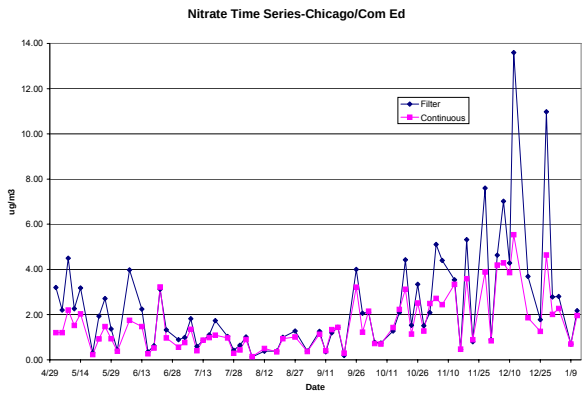
Speciation, cont.

- Continuous carbon, sulfate, & nitrate instruments

Continuous Monitor Trailer

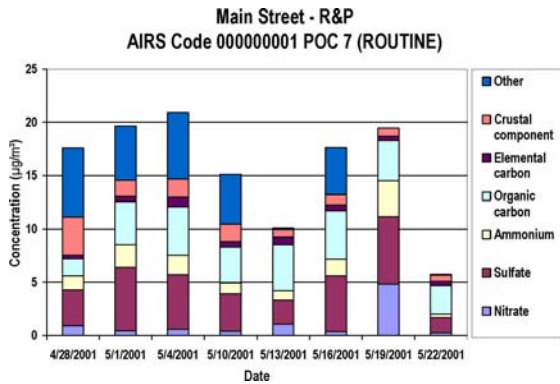
Monitor Installation





Speciation, cont.

- Speciation Data Validation Analysis Tool (SDVAT)
  - Purpose: Developed to assist monitoring agencies in reviewing and validating data from RTI's monthly analytical reports.
  - System Requirements: Personal computer with Pentium 300 MHz (or similar) processor, 256 MB RAM, adequate hard disk space, Windows 95/98/ME/NT/2000, and Microsoft Excel 2000 (Microsoft Office 2000 Professional suite preferred).
  - Microsoft Access Application
  - Features:
    - Data Completeness
    - Time Series Analysis
    - Mass Reconstruction Analysis
    - Species Distribution Analysis
  - Funds allocated to enhancements, training



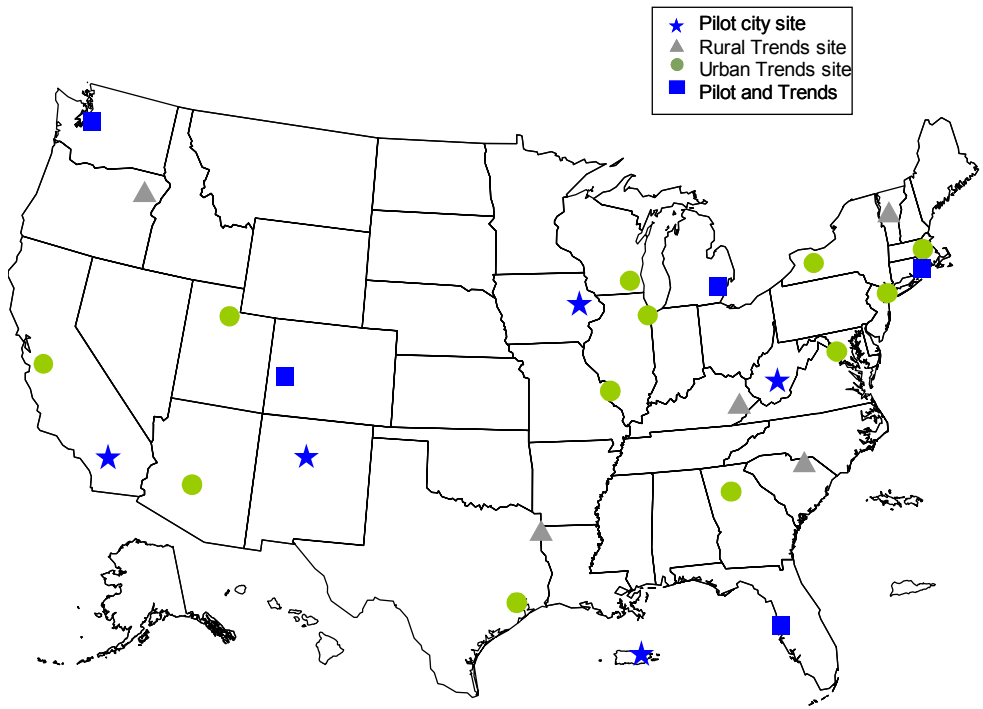
Toxics

- General
  - Pilot monitoring program completed several years ago
  - National network initiated 2001-2002
    - 6 “Priority” and 18 “Core” Hazardous Air Pollutants (HAPs) for NATTS
  - Local scale projects prioritized
  - There <u>are</u> method issues and developments

Toxics, cont.

National Network – National Air Toxics Trends Stations (NATTS)

- 22-site network that may grow if the data analysis results show the need
- 16 urban and 6 rural sites
- Were chosen for their representativeness of high-risk areas as well as for their current infrastructure
- Goals
  - •Trends – To assess trends and program effectiveness (major national effects such as mobile source rules) in representative rural and urban areas for a 6 year minimum study.
  - •Support exposure assessments to provide ambient concentrations for comparison with personal measurements.
  - •Model evaluation. Monitor to model evaluations with NATA and other modeling.



Toxics, cont.

- Local-Scale Objectives
  - Program Accountability. Can we measure progress of local program efforts? Use pre- and post- monitoring as a tool.
  - Problem Identification. Characterize specific source impacts (e.g. airports, large facilities) on surrounding neighborhoods
  - Increase spatial characterization in urban areas.
  - Test new technologies that advance our ability to characterize pollutants
  - Support evaluation of air quality models
  - Provide air quality screenings to aid in addressing future monitoring needs.
- State/Local/Tribal Area Grants (STAG) (Section 103) of approximately $6 million per year
  - Open competition for up to 12 projects nationwide
  - Current competition ended March 31, 2004

Toxics, cont.

Method issues and developments

- Method issues exist for 3 of 6 Priority HAPs
  - Work currently in progress on Acrolein
    - Measurement with TO-11a not recommended
  - More characterization needed for Cr (VI)
  - Research needed by ORD to improve sensitivity, stability for 1,3-Butadiene
- Continuous formaldehyde instruments (Alpha-Omega) will be installed in Detroit, St. Louis, Atlanta (existing), and Seattle.
  - One objective for the measurements is to understand diurnal variations AND how it relates to other pollutants such as continuous fine particulate.
  - Continuous formaldehyde will be operated initially in conjunction with the standard cartridge-based method (TO-11a).
- High resolution CO instruments are being placed in Detroit, Underhill VT (our rural site), St. Louis, and Seattle.
  - These are 'test' instruments and are slated to help assess diesel impacts when combined with BC and or EC data, and also to assess weekly changes in concentrations.
  - In addition, the theory that continuous CO measurements can aid as a marker for BTEX compounds

PAMS

- What is Up with PAMS?
  - Proposal to change/reduce minimum PAMS requirements
  - Reduce number of PAMS sites per area
  - Reduce speciated organic sampling
  - Implement trace level NOy and CO at non-Type 2 sites
  - Allow states more flexibility in conducting PAMS monitoring
- OAQPS has new leadership for PAMS
  - Kevin Cavender, Program Manager (cavender.kevin@epa.gov)
  - Lance McCluney, Team Lead for Data Assessment (mccluney.lance@epa.gov)
- OAQPS will be contacting Regions and State and local agencies to update information on PAMS monitoring sites, contacts, etc.

Trace Gases

- New trace level monitors will be included as part of the NCore network.
  - Reactive nitrogen (NO/NOy)
  - CO
  - SO2
- OAQPS is currently studying trace level monitors in order to -
  - Identify and resolve issues with methods
  - Develop internal expertise needed to support implementation
  - Prepare support documents (example SOPs, Technical Assistance Documents, etc.)
- Contacts
  - NO/NOy – Kevin Cavender (cavender.kevin@epa.gov)
  - CO – Dennis Mikel (mikel.dennisk@epa.gov)
  - SO2 – Solomon Ricks (ricks.solomon@epa.gov)

PM: coarse, continuous

- Standards:
  - NAAQS review for PM in progress . The CAA requires review every 5 years.
  - Current staff recommendations
    - PM2.5 primary standards should continue to be based on both annual & 24-hr averaging times.
      - The Administrator should consider selecting the level of the annual PM2.5 primary standard from within the range of 15 ug/m3 to approximately 12 ug/m3.
      - The Administrator should consider revising the 24-hour PM2.5 primary standard, <u>selecting from a level from approximately 50 to 30 ug/m3.</u>
    - <u>A sub-daily secondary standard for PM2.5 is garnering serious consideration for visibility</u>
  - New PM10-2.5 primary standards should be established for both annual and 24-hour averaging times, with <u>possible consideration given to establishing just a 24-hour standard</u>.
    - The Administrator should consider selecting the level of the annual PM10-2.5 primary standard from within the range of approximately 30 ug/m3 to approximately 13 ug/m3
    - The Administrator should consider selecting the level of a 24-hour PM10-2.5 primary standard from within the range of approximately 75 ug/m3 to 30 ug/m3

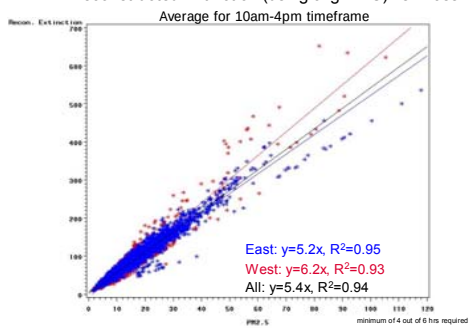
<u>Reconstructed Extinction from PM2.5 speciation</u>

$$
\begin{aligned}
b_{ext} = {} & (3)f(RH)[SULFATE] + \\
& (3)f(RH)[NITRATE] \\
& +(4)[OMC] && \text{mass, organic C} \\
& +(10)[LAC] && \text{mass, elemental C} \\
& +(1)[SOIL] \\
& +(0.6)[CM] && \text{mass, PMcoarse} \\
& +10 && \text{Rayleigh scattering by gases}
\end{aligned}
$$

Where b_{ext} is the calculated total light extinction in inverse megameters, Mm-1)

Reconstructed Extinction (using avg PMC) vs. Mass

Average for 10am-4pm timeframe



PM: coarse, continuous, other pollutants

- Monitoring Regulations:
  - Working draft of preamble and regulatory changes has been written
    - Preamble working draft has been reviewed by internal OAQPS-EMAD legal counsel
  - Part 50 - Standards and reference methods
    - Only change is to reduce PM2.5 data reporting requirements
      - retain flags for flow rate, ambient T, elapsed time.
      - Only retain T and BP averages for sample period only.
  - Part 53 - Testing of Reference and Equivalent Methods
    - Equivalency for PM2.5 continuous methods
    - Network DQO's have been tied to equivalency criteria
  - Part 58
    - Data Certification by May 1, each year
    - Phased in AQS data reporting requirements:
      - 60 days in '07
      - 45 days in '09
  - Overall changes
    - NAMS/SLAMS goes to National Core (NCore) levels 2 & 3
    - Emphasis on multiple objectives rather than just attainment/non-attainment
    - Phased in approach from now through 2007
    - More reliance on use of performance based measurement systems
    - Transition from routine criteria gases (CO, SO2, NO2) to trace level boxes
    - Use of new (2003) US census definitions

Monitoring and Analyses

The End (finally)!

AQS Conference, 5/26/04
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