# Air Toxics Update

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# Air Toxics Update

- NATTS Program Updates
  - Assessment
  - Technical Assistance Document Guidance
  - QA updates
- Air Toxics Data Analysis
- Air Toxics Method Development work
- Community Scale Grants

# NATTS Updates

- New NATTS Team at OAQPS
  - Greg Noah – QA
  - Laurie Trinca – Funding/CSATAM
  - Data Analysis
    - Dennis Doll
    - Madeline Strum
  - Dave Shelow – Program Manager

# NATTS Assessment

- 1st NATTS Assessment (2003-2010) completed
  - Drop Cr+6 as required pollutant
  - Increase funding for equipment $25K/site (one time)
  - Re-evaluate DQO's
  - Incorrect data in AQS needed corrected
  - Increased PT frequency
  - Link ambient data with health benchmarks
  - Site specific reports created & reviewed with each site & corresponding lab
  - Feedback from calls – training
- 2nd NATTS Assessment (2003-2013) started

# NATTS cont…

- From assessment, created a near term vision:

- Increase the quality of the data
- Consistency with all sites and labs within the network
- Find method issues and solve
- Improve communication and discussions

# Increase the Quality of the data

- Proficiency Test (PT) program
  - Contract modifications
  - Data comparison changes
- TSA audits for field sites and labs
  - Experience auditors doing audits
  - Accountability – corrective action
- Data validation templates

# PAH PT

## Compared to Nominal Spike Level

| | | | | | | | | average | stdev | %RSD |
|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 75.6% | 72.9% | 89.1% | 88.5% | 83.4% | 75.0% | 86.6% | 81.6% | 6.9% | 8% |
| Anthracene | 97.5% | 85.4% | 94.5% | 110.4% | 89.2% | 67.2% | 95.6% | 91.4% | 13.2% | 14% |
| Benzo(a)pyrene | OK | OK | OK | RL > 0.2 | OK | OK | OK | NA | NA | NA |
| Fluoranthene | 83.0% | 76.2% | 93.4% | 86.7% | 90.4% | 84.4% | 94.0% | 86.9% | 6.3% | 7% |
| Fluorene | 73.2% | 71.0% | 98.1% | 146.9% | 97.2% | OK | 91.4% | 96.3% | 27.4% | 28% |
| Naphthalene | 81.7% | 83.1% | 111.1% | 100.1% | 109.9% | RL > T*125% | 105.0% | 98.5% | 13.1% | 13% |
| Phenanthrene | 93.4% | 83.4% | 93.0% | 98.8% | 121.2% | 74.3% | 88.3% | 93.2% | 14.7% | 16% |
| Pyrene | 75.4% | 81.2% | 100.0% | 113.3% | 88.6% | F NEG | 93.8% | 92.1% | 13.6% | 15% |

## Compared to Referee Lab Result

| compound | | | | | | | | average | stdev | %RSD |
|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 78.5% | 75.7% | 92.5% | 92.0% | 86.6% | 77.9% | 90.0% | 84.8% | 7.2% | 8% |
| Anthracene | 103.1% | 90.3% | 99.9% | 116.8% | 94.4% | 71.1% | 101.1% | 96.7% | 14.0% | 14% |
| Benzo(a)pyrene | OK | OK | OK | RL > 0.2 | OK | OK | OK | NA | NA | NA |
| Fluoranthene | 84.5% | 77.5% | 95.1% | 88.3% | 92.0% | 86.0% | 95.7% | 88.4% | 6.5% | 7% |
| Fluorene | 81.1% | 78.7% | 108.7% | 162.8% | 107.7% | OK | 101.3% | 106.7% | 30.4% | 28% |
| Naphthalene | 55.0% | 55.9% | 74.7% | 67.4% | 74.0% | RL > T*125% | 70.7% | 66.3% | 8.8% | 13% |
| Phenanthrene | 94.3% | 84.2% | 93.9% | 99.7% | 122.4% | 75.0% | 89.2% | 94.1% | 14.8% | 16% |
| Pyrene | 78.5% | 84.6% | 104.2% | 118.1% | 92.3% | MARGINAL | 97.7% | 95.9% | 14.2% | 15% |

## Compared to NATTS Lab Mean

| compound | | | | | | | | average | stdev | %RSD |
|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | 92.7% | 89.3% | 109.2% | 108.5% | 102.2% | 92.0% | 106.2% | 100.0% | 8.5% | 8% |
| Anthracene | 106.7% | 93.4% | 103.4% | 120.8% | 97.6% | 73.5% | 104.6% | 100.0% | 14.5% | 14% |
| Benzo(a)pyrene | OK | OK | OK | RL > 0.2 | OK | OK | OK | NA | NA | NA |
| Fluoranthene | 95.5% | 87.7% | 107.5% | 99.9% | 104.0% | 97.2% | 108.2% | 100.0% | 7.3% | 7% |
| Fluorene | 84.9% | 82.4% | 113.8% | 170.5% | 112.8% | OK | 106.1% | 111.7% | 31.8% | 28% |
| Naphthalene | 82.9% | 84.4% | 112.8% | 101.6% | 111.6% | RL > T*125% | 106.6% | 100.0% | 13.3% | 13% |
| Phenanthrene | 100.2% | 89.5% | 99.8% | 106.0% | 130.0% | 79.7% | 94.8% | 100.0% | 15.7% | 16% |
| Pyrene | 81.9% | 88.2% | 108.7% | 123.1% | 96.2% | MARGINAL | 101.9% | 100.0% | 14.8% | 15% |

# "*Consistency Across all labs*"

- Updating the NATTS Technical Assistance Document (TAD)
  - More prescriptive
  - Data reporting

# Air Toxics Data Analysis

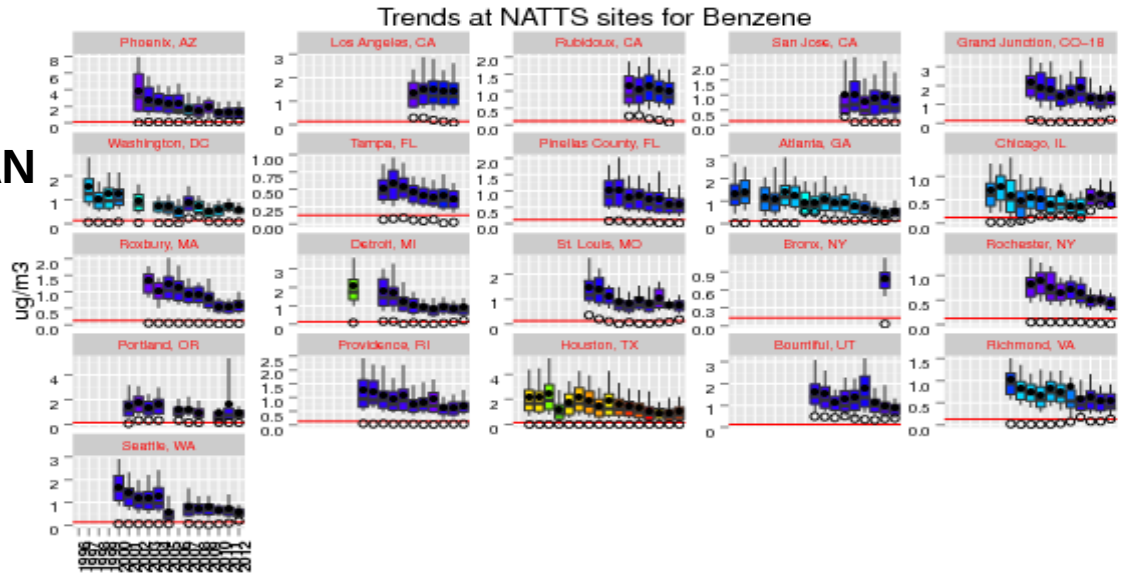
- 2011 NATA
- Time series plots by pollutant and site
  - Linking benchmark risk and ambient data
- Near term goal – Create map on AMTIC
    - Time series plots
    - NATTS assessment site reports
- Long term goal – GeoPlatform (mapping tool)
    - Ambient data
    - NEI emission data
    - Health benchmark data

# 2011 NATA Schedule

- **2011 NATA**
  - Based on 2011 NEI
  - Release expected in 2015 (4 year lag)
  - Improved temporal and spatial allocations
  - Approximately 178 HAPs + DPM
  - Census tract/block resolution
  - Integrate with CMAQ
  - Improved atmospheric chemistry
- **Fall 2014** - Remodel with NEI Version 2
  - This will include both AERMOD, CMAQ, and hybrid modeling
- **Fall 2014** - Develop NATA website and technical support document
- **Winter 2014/Spring 2015** – Work with Regions on S/L/T preview of all NATA risk results
  - We expect the preview to be similar to earlier NATA R/S/L/T previews with regional and state specific data, webinars, & communication materials
- **Spring 2015** - Expected public release

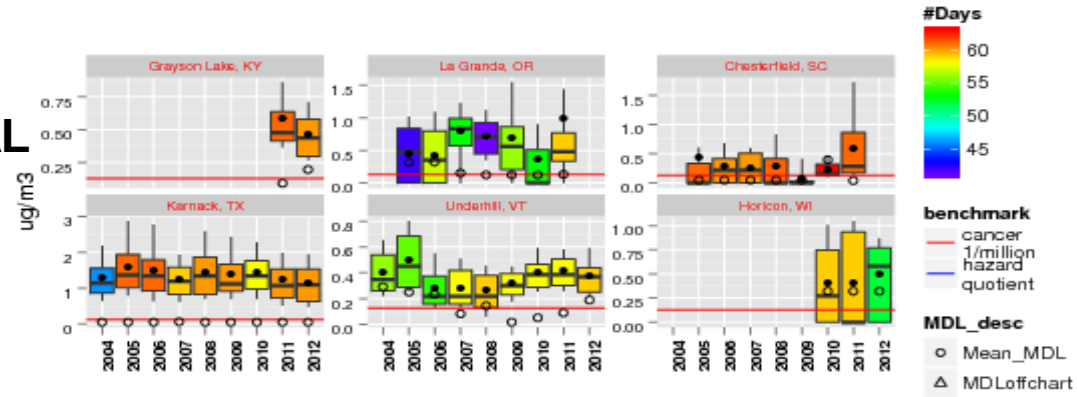
# Time Series Plots by Pollutant

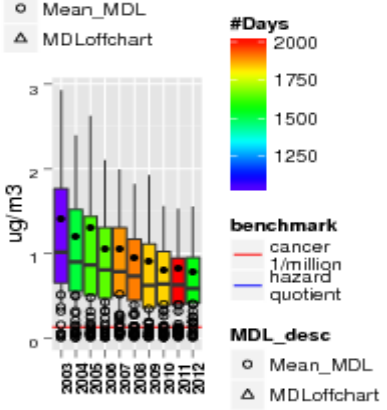
**URBAN**



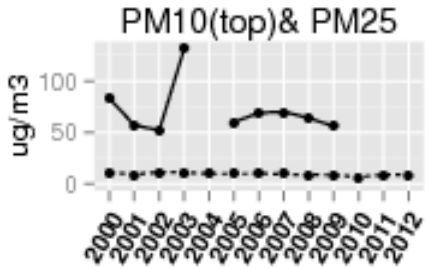

**BENZENE ACROSS NATTS**

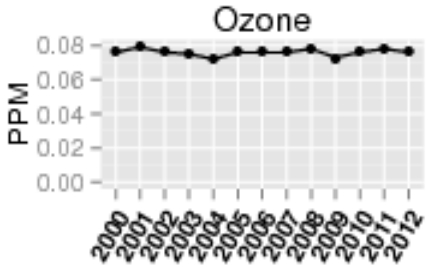
**RURAL**



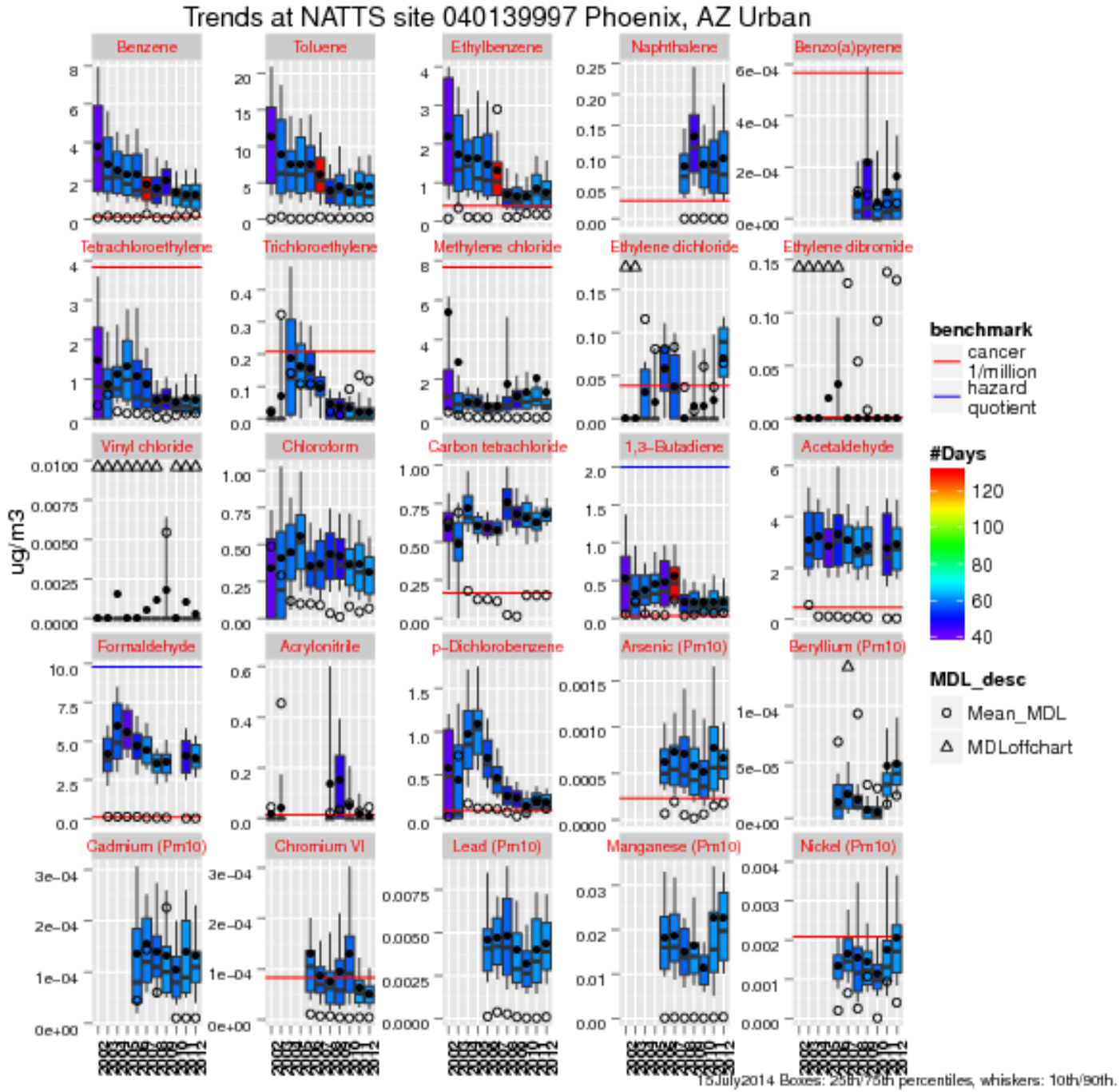

**ALL SITES**



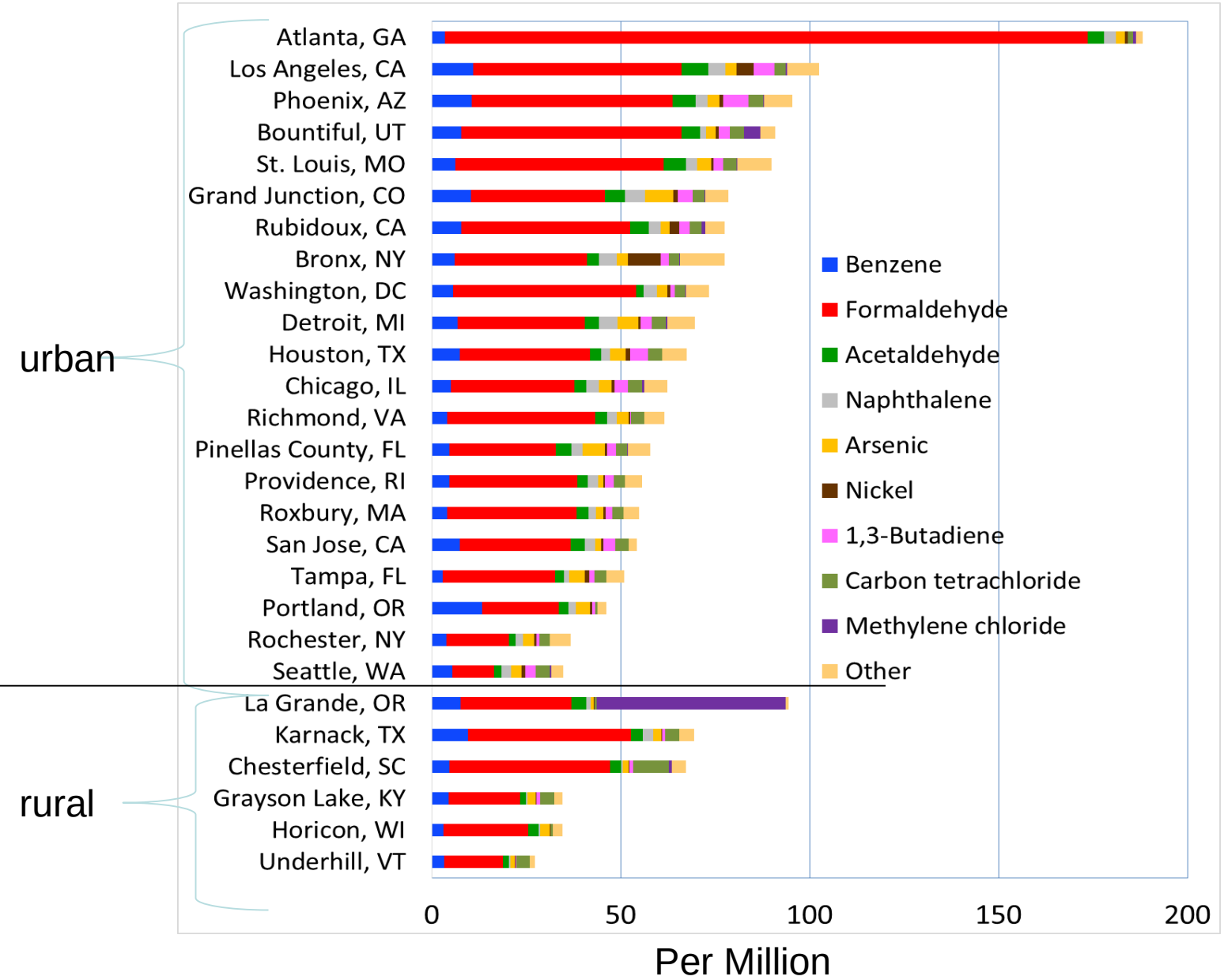




Health Benchmarks (ug/m3)

| | hazard quotient | cancer risk 1 per million |
|---|---|---|
| Benzene | 30 | 0.128 |
| Toluene | 5e+03 | NA |
| Ethylbenzene | 1e+03 | 0.4 |
| Naphthalene | 3 | 0.0294 |
| Benzo(a)pyrene | NA | 0.002568 |
| Tetrachloroethylene | 40 | 3.85 |
| Trichloroethylene | 2 | 0.208 |
| Ethylene dibromide | 9 | 0.00167 |
| Methylene chloride | 600 | 7.69 |
| Ethylene dichloride | 2.4e+03 | 0.0385 |
| Vinyl chloride | 100 | 0.114 |
| Chloroform | 98 | NA |
| Carbon tetrachloride | 100 | 0.167 |
| 1,3-Butadiene | 2 | 0.0333 |
| Acetaldehyde | 9 | 0.455 |
| Formaldehyde | 9.8 | 0.0769 |
| Acrylonitrile | 2 | 0.0147 |
| p-Dichlorobenzene | 800 | 0.0909 |
| Arsenic (Pm10) | 0.015 | 0.000233 |
| Beryllium (Pm10) | 0.02 | 0.000417 |
| Cadmium (Pm10) | 0.01 | 0.000556 |
| Chromium VI | 0.1 | 8.33e-05 |
| Lead (Pm10) | 0.15 | NA |
| Manganese (Pm10) | 0.3 | NA |
| Nickel (Pm10) | 0.09 | 0.00208 |



# Cancer Risk across NATTS sites based on ambient data- 2011




Most sites exceed 50 per million

Formaldehyde range: 11 to 170 per million

Acetaldehyde range: 1.7 to 7 per million

Benzene range: 3 to 13 per million

Other: sum of 32 cancer HAPs

# HAP Trends at NATTS, 2003-2012 Correlation/significance based on Spearman Rank Correlation

| | | Mobile | | | | Carbonyls | | PAHs began 2007/8 | | Chlorinated & other VOCs | | | | | | | | | | Metals | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Benzene | Toluene | Ethylbenzene | 1,3-Butadiene | Acetaldehyde | Formaldehyde | Benzo(a)pyrene | Naphthalene | p-Dichlorobenzene | Acrylonitrile | Carbon tetrachloride | Chloroform | Ethylene dibromide | Ethylene dichloride | Tetrachloroethylene | Trichloroethylene | Methylene chloride | Vinyl chloride * | Chromium VI | Lead (Pm10) | Manganese (Pm10) | Arsenic (Pm10) | Beryllium (Pm10) | Cadmium (Pm10) | Nickel (Pm10) |
| URBAN | Phoenix, AZ | -1.0 | -0.8 | -0.8 | -0.7 | -0.6 | -0.7 | 0.2 | 0.4 | -0.83 | -0.6 | 0.4 | -0.6 | 0.2 | 0.3 | -0.8 | -0.9 | 0.2 | 0.3 | -0.7 | -0.6 | 0.3 | 0.04 | 0.4 | -0.4 | 0.5 |
| | Los Angeles, CA | 0.1 | -0.7 | -0.6 | 0.4 | 0.8 | -0.8 | -0.7 | 0.6 | 1 | | 0.8 | 0.8 | 0.3 | 1 | -1 | 0 | 0.8 | 0 | -1 | -0.9 | 0.1 | -0.3 | -0.6 | -0.2 | 0.8 |
| | Rubidoux, CA | -0.7 | -1 | -0.2 | -0.4 | -0.8 | -0.8 | -0.6 | 0.9 | -0.2 | | 1 | -0.4 | 1.0 | 1 | -0.8 | -0.6 | 0.8 | 0.8 | -1 | -0.7 | 0.03 | -0.8 | -0.8 | -0.2 | 0.8 |
| | San Jose, CA | -0.6 | -1 | -0.6 | -0.7 | -0.5 | -0.5 | 0 | -0.4 | | 0.7 | 0.6 | 1 | | 0.7 | -0.31 | -0.9 | 0.9 | 0.7 | | -0.4 | 0.5 | -0.1 | 0.8 | -0.9 | 0.5 |
| | Grand Junction, CO | -0.9 | -0.7 | -0.5 | -0.4 | -0.5 | -0.5 | 0.1 | 0.7 | 0.2 | -0.02 | 0.7 | 0.5 | 0.9 | 0.8 | 0.43 | 0.8 | 0.7 | 0.5 | -0.8 | -0.8 | -0.4 | -0.08 | -0.07 | 0 | 0.9 |
| | Washington, DC | -0.4 | -0.4 | -0.3 | -0.8 | -0.2 | -0.3 | -0.8 | -1 | -0.9 | 0.3 | 0.3 | -0.05 | 0.4 | 0.5 | -0.3 | -0.5 | 0.8 | 0.8 | -0.3 | -0.8 | -0.1 | 0.8 | -0.05 | -0.7 | -0.9 |
| | Tampa, FL | -0.9 | -0.8 | -0.6 | -0.6 | -0.3 | 0.3 | 0.9 | 0.3 | -1.0 | -1 | -0.7 | 0 | -0.6 | 0.5 | -0.9 | -0.4 | -0.02 | 0.1 | -0.3 | -0.7 | -0.2 | -0.3 | 0.5 | -0.8 | -0.6 |
| | Pinellas County, FL | -0.9 | -0.9 | -0.9 | -0.6 | 0.2 | -0.2 | 0.3 | 0.3 | -0.8 | -1 | -0.5 | -0.2 | -0.6 | 0.5 | -1.0 | -0.8 | 0.5 | -0.3 | -0.4 | -0.02 | -0.02 | 0.6 | 0.7 | -1.0 | -0.9 |
| | Atlanta, GA | -0.8 | -0.9 | -0.9 | -0.5 | -0.8 | 0.3 | -0.3 | 0.1 | -0.4 | | 0.3 | 0.5 | -0.2 | 0.2 | -0.2 | -0.2 | 0.8 | | -0.8 | -0.9 | -0.28 | 0.08 | 0.9 | 0.2 | 0.3 |
| | Chicago, IL | 0.3 | -0.4 | -0.3 | 0.4 | 0.3 | 0.3 | 0.4 | 0.2 | -0.4 | 0.6 | -0.3 | 0.4 | | 0.8 | -0.17 | -1.0 | 0.7 | 0.7 | -0.6 | -0.8 | 0.02 | -0.1 | -0.4 | -0.8 | -0.4 |
| | Roxbury, MA | -0.9 | -0.9 | -1.0 | -0.8 | -0.7 | -0.5 | -0.4 | -0.8 | -0.9 | 0.5 | -0.7 | -0.7 | 0.4 | 0.9 | -0.9 | -0.6 | 0.5 | 0.7 | -0.6 | -0.7 | -0.3 | -0.3 | 0.05 | -0.7 | -0.9 |
| | Detroit, MI | -0.9 | -0.7 | -0.2 | -0.07 | -0.6 | -0.6 | 0.6 | 0.8 | -0.4 | 0.3 | -0.2 | 0.1 | 0.6 | 0.6 | -0.6 | -0.7 | 0.9 | -0.02 | -0.3 | -0.9 | -0.8 | -0.9 | -0.8 | -0.9 | -0.5 |
| | St. Louis, MO | -0.8 | -0.7 | -0.7 | 0.03 | -0.3 | -0.6 | -0.1 | -0.3 | 0.5 | 0.4 | 0.7 | 0.7 | 0.7 | 0.9 | 0.43 | -0.42 | 0.8 | 0.7 | 0.07 | -0.5 | 0.42 | -0.6 | 0.4 | -0.8 | -0.3 |
| | Rochester, NY | -1.0 | -0.9 | -0.9 | -0.8 | 0.5 | 0.6 | 1 | -1 | -0.3 | | -0.7 | -0.7 | -0.5 | 0.7 | -0.9 | -0.9 | 0.2 | 0.4 | 0.6 | -0.9 | -0.5 | 0.2 | -0.3 | -0.9 | 0.2 |
| | Portland, OR | -0.5 | -0.8 | -0.5 | 0.7 | -0.4 | -0.9 | -0.2 | 0.2 | -0.2 | | 0.5 | 0.2 | | -0.2 | -0.4 | -0.4 | -0.1 | -0.4 | -0.9 | -0.9 | -0.9 | -0.9 | -0.6 | -0.8 | -0.6 |
| | Providence, RI | -0.9 | -0.9 | -0.8 | -0.9 | -0.1 | 0.3 | -1 | -0.4 | -0.7 | 0.5 | -0.8 | 0.01 | 0.5 | 0.8 | -0.9 | -0.9 | -0.1 | 0.7 | -0.02 | -0.9 | -0.9 | 0.73 | 0.7 | -0.4 | -1.0 |
| | Houston, TX | -0.9 | -0.9 | -0.9 | -0.9 | -0.9 | -0.9 | 0.5 | -0.8 | | | -0.6 | 0.42 | -0.8 | -0.7 | 0.4 | -0.4 | 0.2 | -0.5 | -0.6 | -0.6 | 0.1 | -0.8 | -0.8 | -0.8 | -0.02 |
| | Bountiful, UT | -0.7 | -0.5 | -0.4 | 0.9 | -0.7 | -0.5 | -0.2 | -0.8 | 0.2 | 0.4 | 0.8 | 0.6 | 0.6 | 0.9 | -0.2 | 0.7 | 0.9 | -0.1 | -0.4 | -0.9 | -0.3 | -0.8 | 0.2 | -0.6 | -0.5 |
| | Richmond, VA | -0.7 | -0.8 | -0.8 | -0.9 | -0.5 | -0.05 | -0.4 | -0.8 | 0.2 | -0.7 | 0.4 | -0.8 | -0.01 | -0.7 | -0.8 | -0.7 | 0.8 | -0.6 | 0.4 | 0 | 0 | 0.4 | -0.4 | -0.8 | -0.8 |
| | Seattle, WA | -0.6 | 0.1 | 0.5 | -0.3 | -0.8 | -0.9 | 0.3 | 0.3 | -0.7 | -0.6 | 0.3 | -0.9 | | 0.9 | -0.9 | -0.9 | 0.8 | -0.1 | -0.7 | -0.8 | 0.02 | -0.7 | -0.1 | -0.8 | 0 |
| RURAL | La Grande, OR | 0.3 | 0 | 0.4 | 0.3 | -0.3 | -0.5 | -1 | 1 | 0.4 | 0.4 | 0.3 | 0.3 | | 0.4 | -0.02 | -0.08 | 0.8 | 0.09 | -0.8 | -0.8 | -0.7 | -0.9 | -0.6 | -0.95 | -1 |
| | Chesterfield, SC | -0.2 | 0.1 | 0.3 | 0.8 | -0.6 | -0.6 | 0.6 | 0.1 | -0.2 | | 0.8 | 0.5 | 0.2 | 0.2 | 0.2 | 0.3 | 0.8 | 0.2 | -0.3 | -0.03 | -0.95 | -0.07 | -0.1 | 0.1 | 0 |
| | Karnack, TX | -0.6 | 0.8 | 0.6 | -0.6 | 0.2 | 0.5 | 0.4 | 0.8 | | | -0.02 | 0.6 | -0.6 | -0.3 | -0.5 | -1.0 | 0.7 | -1.0 | -0.6 | 1 | 0.5 | 0.08 | -1 | -1 | -1 |
| | Underhill, VT | -0.03 | -0.1 | -0.2 | 0.2 | 0.07 | 0.05 | -0.6 | -0.8 | -0.6 | -0.2 | 0.5 | -0.9 | -0.4 | -0.2 | -0.5 | -0.7 | -0.02 | -0.4 | -0.4 | -0.4 | 0.4 | -0.5 | 0.4 | -0.6 | 0.2 |

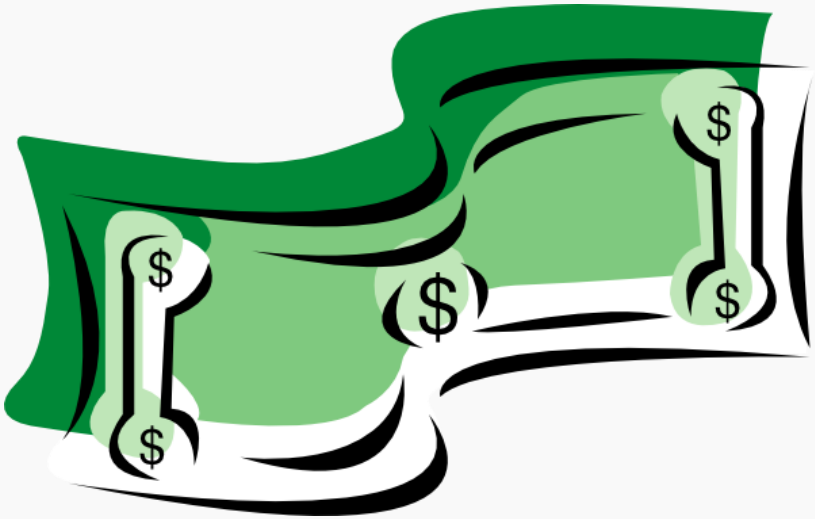
Decreasing Increasing Not significant

# Air Toxics Methods Issues

- Ongoing research – Acrolein
  - ORD will provide guidance
- Carbonyls
  - Work group
  - Optimization of TO-11A
  - Feasibility of Real time measurements
- Next pollutant – Naphthalene

# Community Scale Grants

- RFP in FY 2014
  - Community monitoring
  - Sectors
  - NGAM - sensors
  - Air Toxics at near road
  - Methods evaluations
- Funding 2015



# In Summary….

- Changes to PT program & TSA
- Get Data in AQS – next network assessment
- TAD rewrite in progress
- New data analysis products and tools
- Methods issues trying to get resolved