

# School Air Toxics Monitoring Initiative

2010 National Training Conference on the Toxics Release Inventory (TRI) and  
Environmental Conditions in Communities

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# School Air Toxics: Initial Charge

- Assess potentially elevated ambient air toxics levels at some of our nation's schools
- Schools selected:
  - Results of 2002 NATA
  - Results from 2008 USA Today Study (using 2005 RSEI/TRI)
  - Recommendations from EPA regional offices, state and local Agencies
  - 2 tribal schools
- School selection criteria:
  - Near large industrial sources
  - Urban areas – near interstates or airports
  - Mix of large and small sources
  - Consideration of Environmental Justice issues

# Project Design

- Monitor for “key pollutants” for at least 60 days collecting minimum of 10 valid samples
- Collect meteorological data for at least 6 months if possible
- Analysis: evaluate air toxics levels at each site to project short- and long-term exposures
- Determine next steps based on analysis results

## School Selection: Challenges

- Several schools databases w/ conflicting information
- Risk calculation differences between NATA and RSEI model used by USA Today
  - NATA emphasis on cancer risk
  - RSEI higher weighting of non-cancer risk
  - Result – different key pollutants and schools identified from each model
- 2002 NEI versus 2005 TRI data
  - Various concerns with emission information
- Additional issues identified by State and local agencies
  - Schools – renamed, closed, moved or scheduled for demolition
  - Facilities closed or emission estimates inaccurate
  - Sources not included in inventories

## Initial Monitoring: Challenges

- Some monitoring results showed surprisingly high VOC levels relative to levels typically monitored
  - Discovered problem with VOC monitoring equipment timer
  - Evaluated data and developed criteria w/ NACAA input for validating/invalidating VOC data
- Additional evaluation pointed to problems specifically w/ method used for acrolein
  - Initiated study of canisters and methods used by different labs
  - Determined acrolein values could not be used for analysis in SAT reports
  - Evaluating how to improve acrolein methods
- Anemometer used:
  - Would get stuck – report no data
  - Might report exceptionally high winds on calm days
  - Lightening and storms might set off

## Analysis at Each School

- Ongoing analysis during 60-day sampling period
  - Quality assurance, short-term exposure analyses
- Post-Sampling Analysis
  - Considers several types of information, including:
    - Concentrations of air toxics monitored at school
    - Wind direction and speed measurements taken at the school
    - Information on nearby sources of air toxics
  - Addresses key questions, such as
    - Was sampling conducted when key source(s) operating and wind was blowing from direction of key source(s) at least part of the time
    - Do monitored concentrations of key pollutants (or others) indicate levels of concern for health impacts related to long-term exposures?
      - Concentrations of key pollutants
      - Concentrations of other pollutants monitored
      - Combined concentrations of multiple pollutants (key or other)

# Example: Individual Sample Review

School Name	Parameter	Units	4/13/2009	4/19/2009	4/25/2009	5/1/2009	5/7/2009	5/11/2009	5/13/2009	5/19/2009	5/25/2009	5/28/2009	5/31/2009	6/6/2009	Sample Screening Level <sup>a</sup>
Ashland City School (470215501)	Manganese PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	7	2.22	6.61	5.88	16.8	3.51	4.06	8.27	0.99	56.4	7.96	3.14	500
	Chromium PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	1.55	0.43	1.04	1.43	1.86	1.34	1.13	0.71	0.67	3.87	1.88	1.13	580 <sup>b</sup>
	Arsenic PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.35	0.6	0.41	0.17	0.51	0.61	0.47	0.65	0.84	0.4	0.76	9.56	150
	Cadmium PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.07	0.07	0.1	0.02	0.04	0.12	0.75	0.13	0.09	0.08	0.13	0.15	30
	Nickel PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.41	0.15	1.01	0.23	0.57	0.68	0.46	2.29	0.49	2.26	0.25	0.13	200
	Antimony PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.33	0.51	0.74	0.41	0.31	0.47	0.44	0.69	0.55	0.49	0.7	1.7	2,000
	Cobalt PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.17	0.03	0.08	0.04	0.18	0.06	0.05	0.1	0.02	1.05	0.07	0.04	100
	Mercury PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.44	0.61	0.41	1.25	0.25	0.29	0.19	0.18	0.09	0.25	0.07	0.14	3000 <sup>c</sup>
	Beryllium PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.002	ND	2E-04	ND	0.03	0.03	0.008	0.006	0.002	0.008	0.01	0.005	20
	Selenium PM <sub>10</sub> (LC)	ng/m <sup>3</sup>	0.67	0.64	0.5	0.13	0.27	0.9	0.69	0.37	3.67	0.5	1.04	0.85	20,000

: Key Pollutant

# Example: Comparison to Long-term Exposure

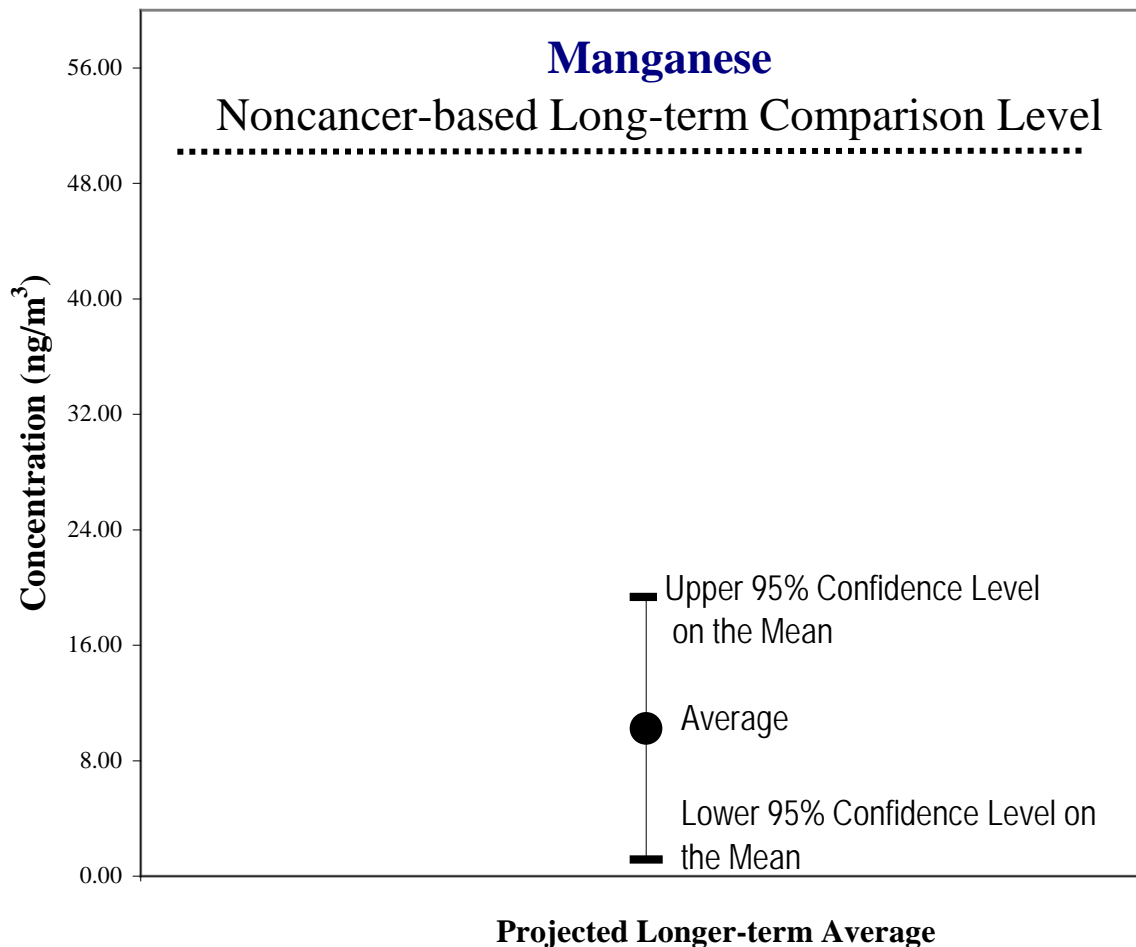
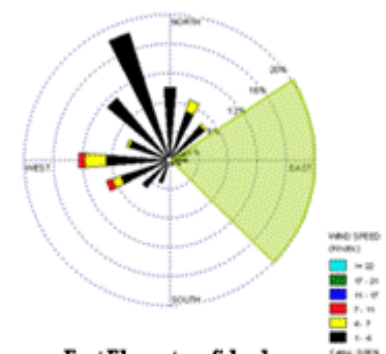
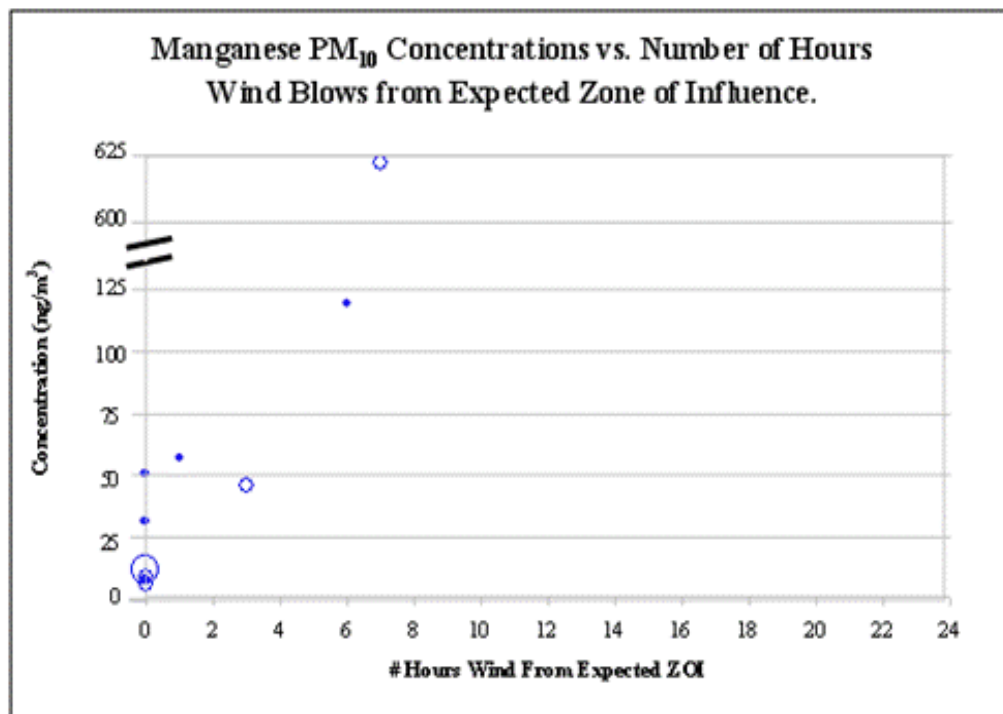
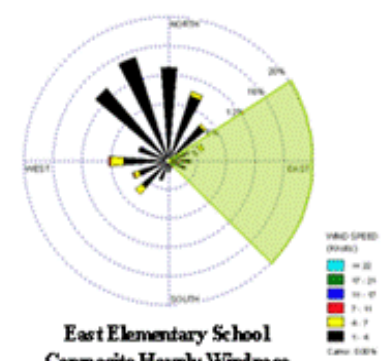




Figure 3. East Elementary School (East Liverpool, OH) Manganese PM<sub>10</sub> Concentration and Wind Information.



East Elementary School  
Composite Hourly Windrose  
on Sample Days  
(Beginning Aug 12-Oct 4, 2009)



East Elementary School  
Composite Hourly Windrose  
For Full Period  
(Aug 12-Oct 4, 2009)

**KEY**

**Pollutant:** Manganese PM<sub>10</sub>  
**Timeframe:** August 12 - October 4, 2009

Note

Each symbol denotes a 24-hour collection of air for chemical analysis. The size of the symbol indicates the magnitude of the wind speed for that day (wind data shown in Table 2). The expected zone of source influence (ZOI) is a rough approximation of the range of directions from which winds carrying chemicals emitted by the key source may originate.

- Wind Speed: 0.1-2.5 mph
- Wind Speed: 2.5-5.0 mph
- Wind Speed: > 5.0 mph

Expected Zone of Source Influence

# Communication of Results

- Technical Report
  - Describes analysis for individual school
  - Includes key findings and recommendations for next steps, such as:
    - Monitoring does not need to be extended
    - Extend monitoring to better characterize pollutant concentrations in the community
    - Evaluate emission reduction options
- Non-technical Summary
  - Presented on EPA web site ([www.epa.gov/schoolair](http://www.epa.gov/schoolair))
  - Findings and analysis from technical report summarized in non-technical language
  - Technical report itself also available from website
- Final Project Report

# Project Status

- Initial monitoring complete at all 65 schools
  - 63 schools in 22 states
  - 2 tribal schools
  - Final data release September 1, 2010
  - Over 73,000 data points processed; 1.47 million values from associated meteorological stations added to AQS data system
- Some schools slated for additional monitoring
  - Screening analysis indicated levels of concern - continue monitoring in the community
  - Key sources being were operating below normal operating capacity – continue/repeat monitoring at school
  - Acrolein measurement issues - continue schools monitoring (timeframe TBD)
- Additional monitoring ranges from additional screening analysis and additional monitors to high-end, state-of-the-art continuous metals monitoring
- 21 final reports (24 schools) completed; additional reports to be finalized through winter 2011
- Final project summary report to be completed in summer 2011
- All reports and data will continue to be posted on the schools website ([www.epa.gov/schoolair](http://www.epa.gov/schoolair))

# Lessons Learned to Date

- Buy-in from partners is critical – we had a lot of help!
  - State/Local Agencies, Communities, EPA Regions
- Need better source specific information
  - Under CAA we cannot require states to collect air toxics information... *but state data is critical!*
  - As some MACT rules are revised we are requiring sources to submit emissions information which may be used to improve inventories
- TRI data – Need better informed industry
  - Data used for more than community right-to-know
  - Sometimes used in regulatory context
  - Better education of industry about other potential uses
- If using models to inform, try to use most recent emission inventory
  - Over 60% of sources had significant emissions reductions from 2002-2008
    - 24-36% of sources had increases in emissions from 2002-2008
  - At least 12 facilities officially requested changes in 2002-2005 TRI data as a result of this project

## Lessons Learned – cont'd

- Consistent application of monitoring methods is important and better methods needed in some areas
  - Working to improve method for acrolein
- The easiest place to monitor isn't always the best
  - Schools are representative of a population but may not best characterize the community
- Good met data – met collection methods important
- Helpful to pilot the concept and work out any bugs before implementation
  - Early efforts by two schools in Tennessee
- Manage Expectations - even what *appears* simple – will take longer than expected