# School Air Toxics Monitoring Initiative

## Overview and Lessons Learned

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Office of Air Quality Planning & Standards, EPA
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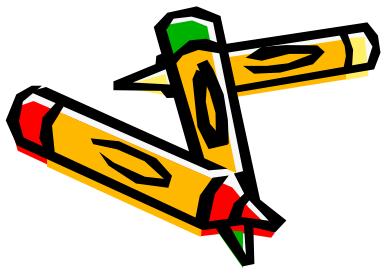
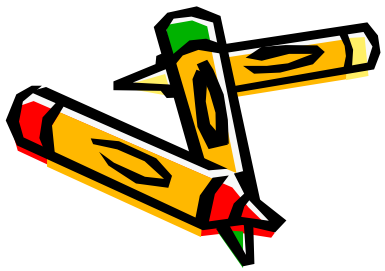
# School Air Toxics: Initial Charge

- 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 TRI)
  - Recommendations from EPA regional offices, State and Local Agencies
  - 2 tribal schools
- Criteria School selection:
  - Near large industrial sources
  - Urban areas – near interstates or airports
  - Mix of large and small sources



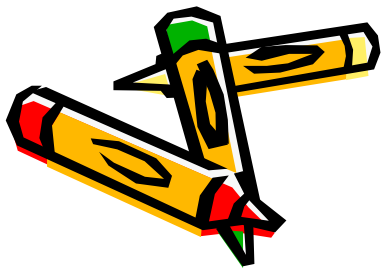
# Project Design

- 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 for short- and long-term exposures
- Determine next steps based on sample results



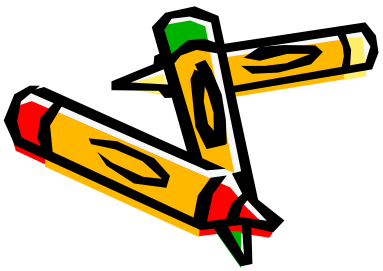
# School Selection: Problems Identified

- Several databases w/ school 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 identified from each model
- 2002 NEI versus 2005 TRI data
  - Concerns with accuracy of some information
- State and local agencies identified
  - Schools – renamed, closed, moved or scheduled for demolition
  - Facilities closed or emission estimates inaccurate
  - Sources not included in inventories



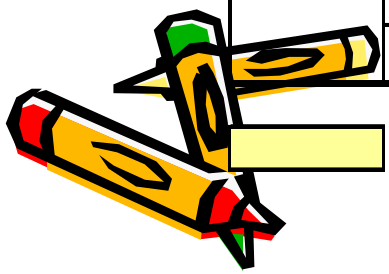
# During Monitoring Period at a School Individual Sample Review

- Individual sample results reviewed in light of individual sample screening levels
  - Sample screening levels help us gauge potential for pollutant levels in air to raise health concerns for **short-term** exposures
- Findings above sample screening levels were considered more closely, with regard to
  - Sample QA/QC
  - Other results for that pollutant at that school (e.g., pattern of concentrations)
  - Information regarding potential sources of pollutant at school and variability
  - Information regarding circumstances associated with health effects, and type of health effects



# Example: Individual Sample Review

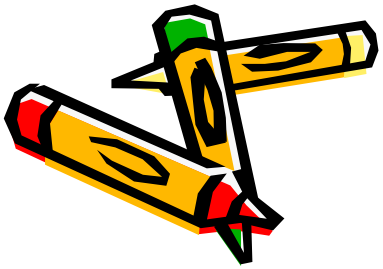
| School Name | Parameter | Units | 4/13/2009 | 4/19/2009 | 4/25/2009 | 5/1/2009 | 5/7/2009 | 5/11/2009 | 5/13/2009 | 5/19/2009 | 5/25/2009 | 5/28/2009 | 5/31/2009 | 6/6/2009 | Sample Screening Level[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ashland City School (470215501) | Manganese $PM_{10}$ (LC) | $ng/m^3$ | 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 $PM_{10}$ (LC) | $ng/m^3$ | 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[b] |
| | Arsenic $PM_{10}$ (LC) | $ng/m^3$ | 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 $PM_{10}$ (LC) | $ng/m^3$ | 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 $PM_{10}$ (LC) | $ng/m^3$ | 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 $PM_{10}$ (LC) | $ng/m^3$ | 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 $PM_{10}$ (LC) | $ng/m^3$ | 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 $PM_{10}$ (LC) | $ng/m^3$ | 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[c] |
| | Beryllium $PM_{10}$ (LC) | $ng/m^3$ | 0.002 | ND | 2E-04 | ND | 0.03 | 0.03 | 0.008 | 0.006 | 0.002 | 0.008 | 0.01 | 0.005 | 20 |
| | Selenium $PM_{10}$ (LC) | $ng/m^3$ | 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

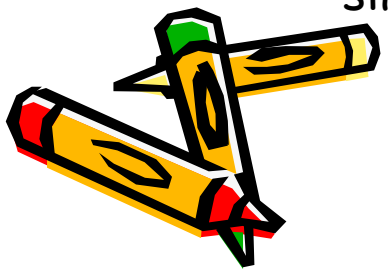
# Initial Monitoring: Problems Identified

- Some pollutants had high values relative to values typically monitored
  - Determined problem with VOC monitoring equipmenttimer
  - Evaluated data and developed criteria w/ NACAA input to validate/invalidate 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



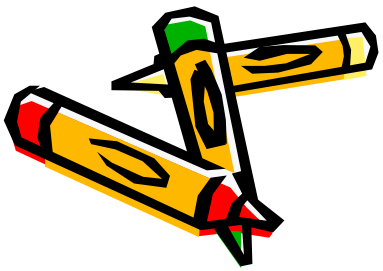
# Analysis At End of Monitoring Period at a School

- 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 during time with potential to see evidence of key source(s)/pollutant(s)
    - Were samples taken on days when winds indicate potential for suspected source(s) to be contributing to air concentrations at the school?
    - Was source(s) operating on sampling days?
    - Any indication that monitoring period conditions are not similar to conditions expected over longer-term?



# Analysis At End of Monitoring Period at a School – cont'd

- Addresses key questions, such as
  - Do monitored concentrations of key pollutants (or others) indicate levels of concern for health impacts related to *(short- or)* long-term exposures?
    - Concentrations of key pollutants
    - Concentrations of other pollutants monitored
    - Concentrations of multiple pollutants (key or other)



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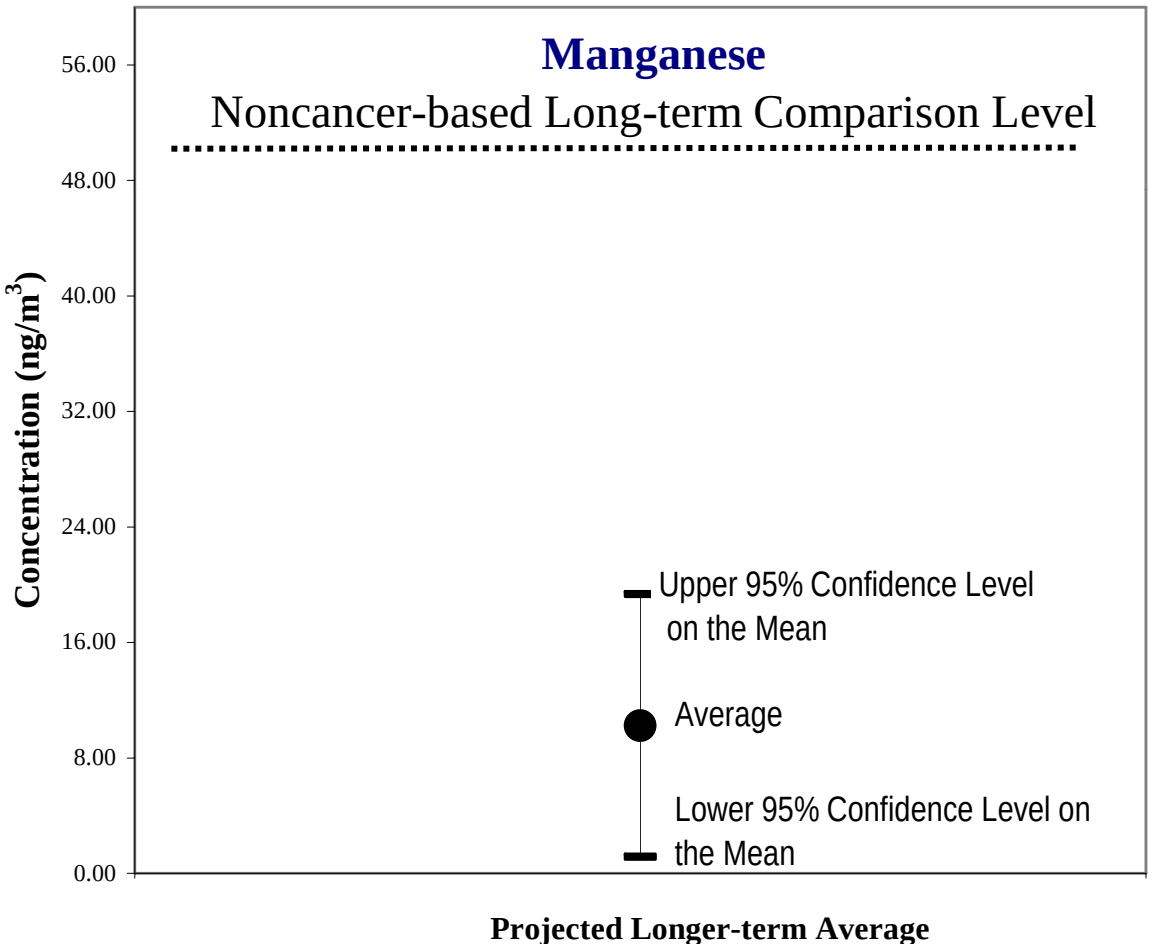
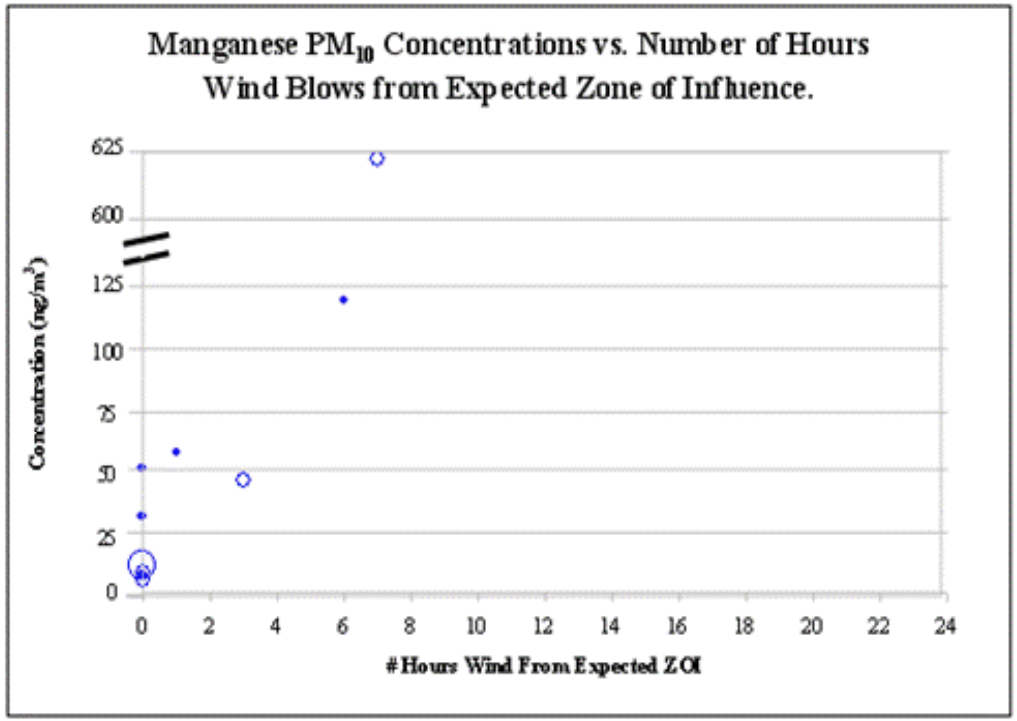
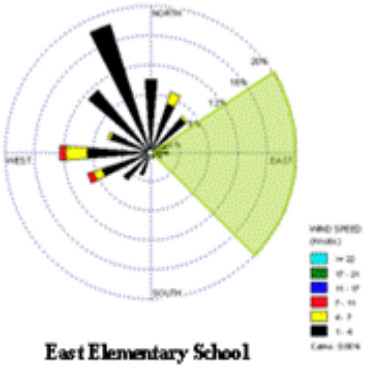
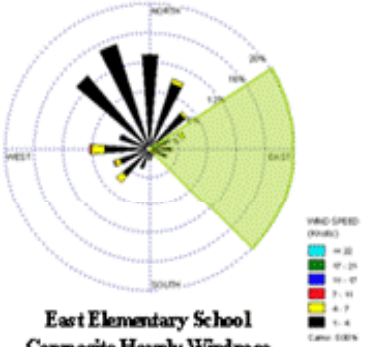


**Figure 3. East Elementary School (East Liverpool, OH) Manganese $PM_{10}$ Concentration and Wind Information.**



**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)**

Expected Zone of Source Influence

KEY

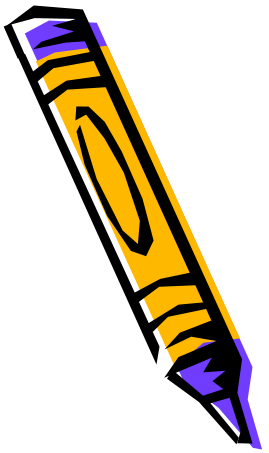
**Pollutant: Manganese $PM_{10}$**
**Timeframe: August 12 - October 4, 2009**

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

# End of Monitoring Period at each School

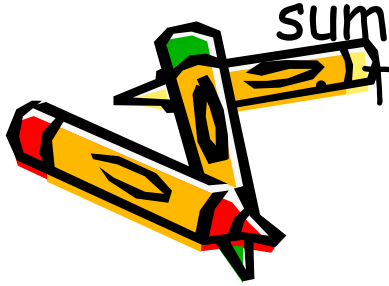


## Technical Report

- 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 n the community
  - Evaluate emission reduction options

## Non-technical Summary

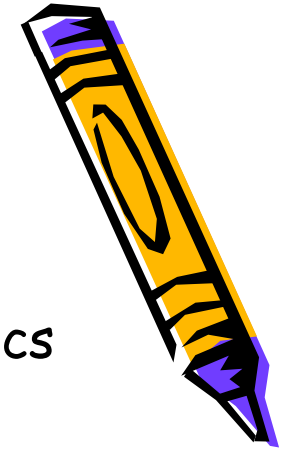
- Presented on EPA web site (www.epa.gov/schoolair)
- Findings and analysis from technical report summarized in non-technical language
  - Technical report itself also available from web site



# 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 form associated meteorological stations added to AQS data system
- Some schools slated for additional monitoring
  - Screening analysis indicated levels of concern to continue monitoring in the community
  - Information about nearby sources being below normal operating capacity; continue schools monitoring
  - Acrolein measurement concerns; 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
- 7 final reports completed; additional reports to be finalized throughout Fall 2010
- Final project summary report to be completed by summer 2011
- All reports and data will continue to be posted on the Schools website (www.epa.gov/schoolair)

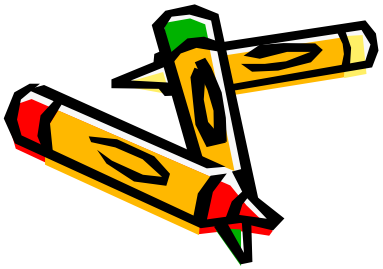
# SAT: Lessons Learned



- Need better source specific information
  - Under CAA can not require states to collect air toxics information… *but state data is critical!*
  - As MACT rules revised requiring sources to submit emission information which may be used to improve inventories
- TRI data – Need better informed industry
  - TRI's primary use is community-right-to-know
  - Data used for other purposes – sometimes regulatory
  - 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 increase in emissions from 2002-2008
  - At least 12 facilities officially requested changes in 2002-2005 TRI data as a result of this project

# SAT: Lessons Learned –cont'd

- Consistent application of monitoring methods and better methods
  - 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
- Need good met data – met collection methods
- Need buy-in from partners
- Helpful to pilot the concept and work out the bugs before implementation
- Even what appears simple – will take longer than expected



# Questions?

- Barbara Driscoll
  - driscoll.barbara@epa.gov
- School Air Toxics:
  - http://www.epa.gov/schoolair/