Midlothian, Texas Ambient Air Collection & Analytical Chemical Analysis Study

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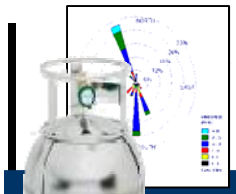
Midlothian, Texas

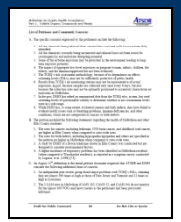
- South of DFW
- Home to:
  - 3 Cement Plants
  - 1 Steel Plant

Timeline of Events

1991 - Present:
Multiple years of air data (stationary and mobile)

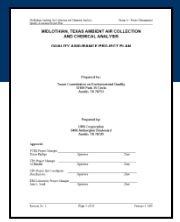


2005:
Citizens petition ATSDR for Health Consultation



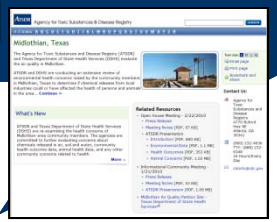
2007:
Draft released – ***Indeterminate Public Health Hazard***

2008:
TD ambient air monitoring study



2009:
Congressional Hearing on ATSDR – Midlothian an example

2009:
ATSDR reviewing Midlothian data again



Draft Health Consultation

- Texas Department of State Health Services (DSHS) conducted the Health Consultation on behalf of ATSDR
- DSHS examined up to 12 years of air monitoring data for ~237 chemicals
- Non-Cancer effects – findings include: not expected, highly unlikely, and not likely
- Cancer effects – findings include: no apparent or low increased risk, measurable effects would not be expected
- However…

Indeterminate Conclusion

"We found that the majority of the risks associated with exposure to the chemicals analyzed in this health consultation were low. However, we are classifying this site as an Indeterminate Public Health Hazard because further information is needed to fully characterize the extent of the public health hazard posed by air contaminants in Midlothian."

–December 11, 2007 Draft Health Consultation

Reasons Given

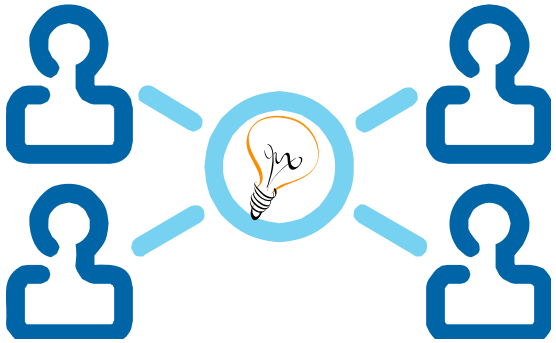
- Health-based screening levels are not available for some chemicals
- Measurements of total Cr versus Cr(VI) are not available for ambient air samples in the Midlothian Area
- DSHS evaluation of EPA's criteria pollutants is not yet available (separate document)
- Data gaps in sampling parameters and locations
  - Volatile Organic Compound (VOC) data only covers 1993 - present
  - Metals data only covers 1981 - 1985 and 1993 - present
  - Monitor locations may not reflect exposure in community

A Study for the Citizens

- **Idea:** Conduct a study in the area with input from the Citizens – ideally such a study will answer the questions and concerns that *they* have
- **1st Step:** Request City put together Citizen Focus Group (CFG)

Participants

- TCEQ – Lead agency
- CFG
- Texas Department of State Health Services (DSHS)
- Informed Parties:
  - EPA
  - ATSDR



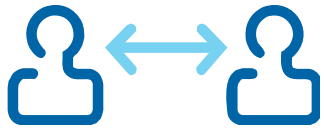
Composition of CFG

- Mayor
- City Manager
- Citizens (~8)
  - Lawyer
  - Engineer
  - Pastor
  - Average citizens

CFG Role

- Help determine what citizen questions/concerns are
- Help prioritize potential sampling efforts
- Help decide how to answer citizen questions/concerns
- Help determine data gaps

TCEQ Role



- Fund the project
- Encourage open communication with citizens through CFG
- Develop scientifically sound scope of work based on citizens input
- Contract with 3rd party for sampling and analytical data analysis
- Evaluate the data
- Provide all data and evaluations on website

1st Study Meeting

- March 24, 2008
  - Presented proposal of small study to CFG and DSHS
    - Purpose of the study
    - Participants and roles
    - Gave example of a study
    - Solicited input from citizens
    - Considerations needed

Purpose of Study

- Fill Data Gaps noted in Draft Health Consultation:
  - Measurements of total Cr versus Cr(VI) were not available for ambient air samples in the Midlothian area
  - Monitor locations may not reflect exposure in community
- Answer Citizen Questions and Concerns

CFG Input Needed

- What do you like/don't like about the example project?
- What chemicals do you want to see sampled (prioritized)?
  - Metals
  - Cr Speciation
  - VOCs
  - Dioxins
- How much sampling would you like to see accomplished?
- Do you have ideas for general sampling locations?
- Do you have ideas for the timing of sampling?
- Do you have any additional concerns you would like us to consider?

Considerations

- Costs
  - Only $400,000 available
- Scope
  - What questions are to be answered?
    - Determines how the study is designed
  - Where should sampling occur?
    - At TCEQ fixed sites
    - In residential areas
    - Upwind/downwind of facilities
  - What types of data are to be collected?
    - Seasonal?
    - Which compounds?
  - What is the project duration?

2nd Study Meeting

- March 31, 2008
  - Gathered all information necessary from citizens and DSHS to help design the study and write scope of work
    - Citizen ideas and input
    - Prioritization of sampling for biding project by task

Citizen Questions/Concerns

- How are industries affecting air quality?
- Is the TCEQ every 6th-day monitoring site an accurate representation of daily air concentrations?
- What is the air quality near schools and parks?
- What percentage of total Cr does Cr(VI) represent?

Study Design

Sample Collection

- Independent 3rd Party Contractor – URS Corporation
- Dates Not Known by Industry

Sample Duration

- Four Sampling Quarters Over One Year
- Five Consecutive Sampling Days/Quarter
- One Sampling Day/Quarter to Coincide with TCEQ Fixed-Site Monitor

Sampling Dates	Every 6th-Day Monitoring Dates
December 6 – 10, 2008	December 8, 2008
February 26 – March 2, 2009	March 2, 2009
May 5 – 9, 2009	May 7, 2009
July 3 – 7, 2009	July 6, 2009

Study Design

Four Stationary Monitoring Sites

1. Collocated with TCEQ Fixed-Site Monitor
2. Downwind of the Steel Plant
3. Park in Middle of the City
4. Downwind of Ash Grove Cement Plant

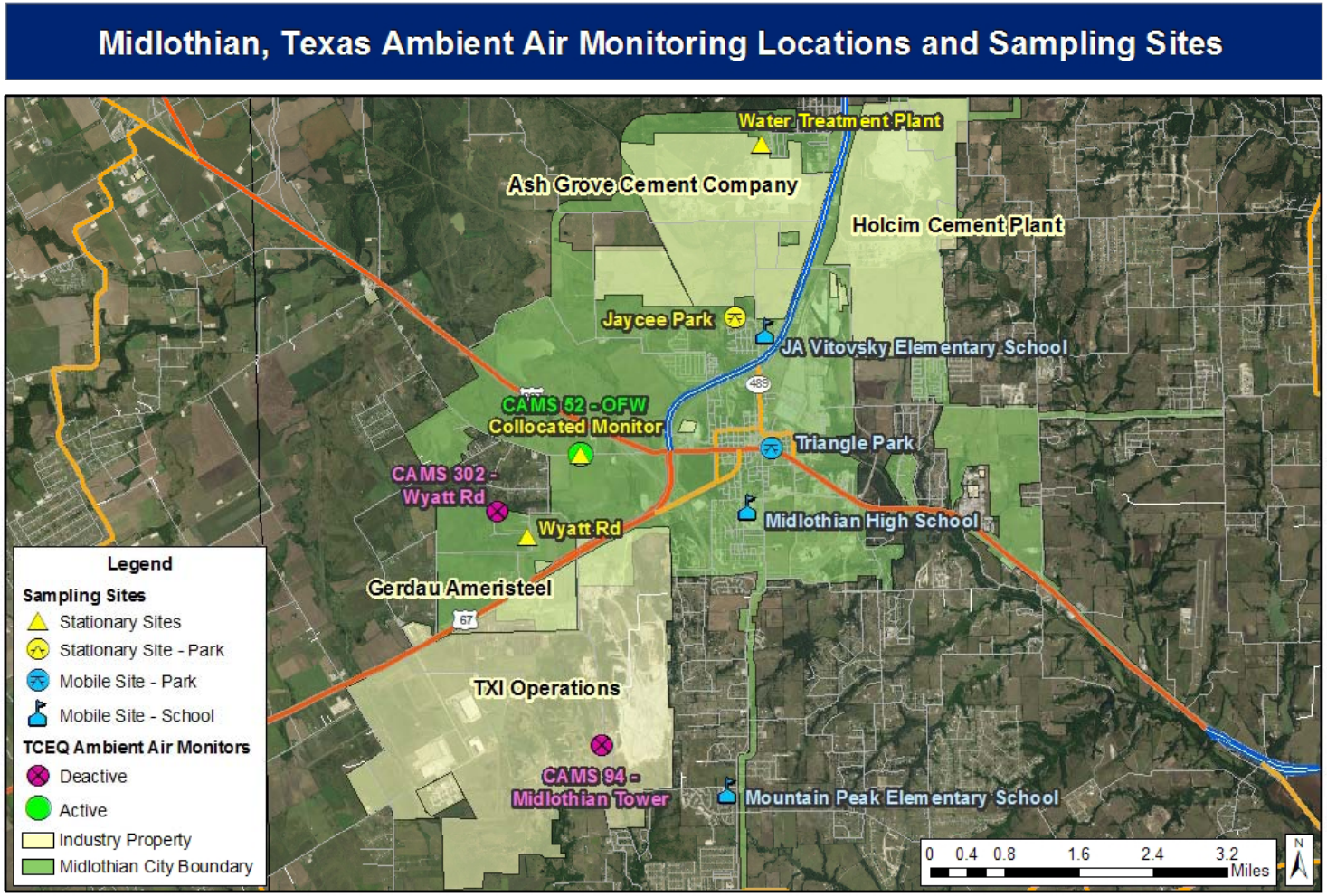
Four "Mobile" Monitoring Sites

- Location Changed Each Quarter
- One Park and Three School Locations

Study Change Requested

- December 1, 2008
  - MISD Superintendent requested schools be included in the study
- December 16, 2008
  - TD asked CFG is they would agree to switch remaining three mobile sites from parks to schools
- December 18, 2008
  - CFG approved switching mobile sites to schools
  - Also requested schools be sampled on weekends to assess emissions from buses and cars
- Weekend sampling request
  - Sampling did occur on at least one weekend day for the last three sampling quarters
  - Not part of original study design, so data could not be adequately collected to assess this

Study Monitor Locations



Study Analytes by Site

Location	VOCs	Metals	Cr(VI)
Stationary Sites			
CAMS 52	✓	✓	✓
Wyatt Rd	X	✓	✓
Jaycee Park	✓	✓	✓
Water Treatment Plant	✓	✓	✓
Mobile Sites			
Triangle Park (1st Quarter)	✓	✓	✓
Mountain Peak Elementary School (2nd Quarter)	✓	✓	✓
J.A. Vitovsky Elementary School (3rd Quarter)	✓	✓	✓
Midlothian High School (4th Quarter)	✓	✓	✓

Evaluation Meetings

- May 18, 2009
  - Presented evaluations of 1st and 2nd quarter data
- July 21, 2010
  - Presented Final evaluation (all quarters)
  - Clarification added to evaluation as a result of questions from CFG

Open House

- October 5, 2010
  - Public availability session for evaluation
  - Conclusions presented via automated PowerPoint presentation
  - TCEQ and CFG available to answer any questions
  - City also present to answer any questions

Based on Citizen Questions/Concerns

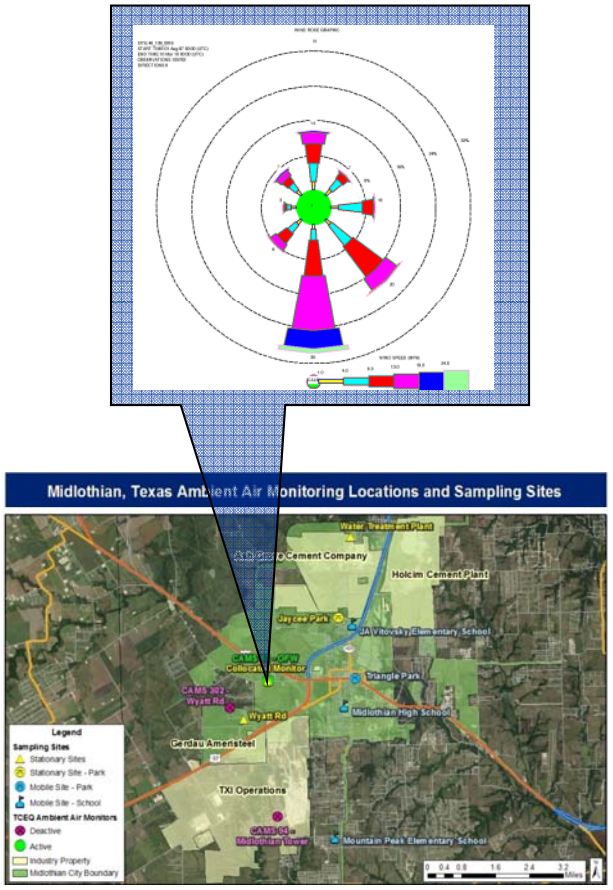
STUDY CONCLUSIONS

How Are Industries Affecting Air Quality?

- VOCs
  - The highest VOC measurements do not correspond to days when winds put the monitors downwind of industry; therefore, the implication is that the sources of benzene, and VOCs in general, are likely not the identified industry in Midlothian.
- PM_{10} Metals
  - Nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air; however, those contributions are slight, all measured levels are still well below their respective AMCVs, and are not of health concern.

Is the TCEQ Every 6th-Day Monitoring Site an Accurate Representation of Daily Air Concentrations?

- The TCEQ fixed site monitor is positioned downwind of TXI and Gerdau Ameristeel when winds are southerly – the predominant wind direction.
- Measured concentrations at the TCEQ fixed site monitor are a good indicator of VOC measurements across Midlothian and, while this site measures potentially worst-case concentrations of PM_{10} metals, is a good indicator of air quality around Midlothian, including schools and parks.



What Is the Air Quality Near Schools and Parks?

- Overall concentrations of VOCs and PM_{10} metals at schools and parks are below levels of health concern.
- There are no clear differences in ambient air between weekend and weekdays at schools.

What Percentage of Total Cr Does Cr(VI) Represent?

- PM_{10} Cr(VI) represents a very small percentage, **1.07%**, of the total Cr measured in the Midlothian area.
- This is well below the DSHS assumption of 100% Cr(VI) in the Draft Health Consultation.

	%Cr(VI) of Total Cr
Highest for any 1 Day Measurement	7.36
Highest Daily Average	2.81
Highest Site Average	1.86
Overall Average	1.07

Successful Study?

- "*You can please some of the people all of the time, you can please all of the people some of the time, but you can't please all of the people all of the time*". –John Lydgate
- However, the Citizens who participated:
  - Provided input for the project and helped mold the design
  - Asked good questions and answers were provided as best as possible
  - **Feel good about the data because they were involved**
  - **Understand and accept the study conclusions**

Questions?

TCEQ Toxicology Division:

Main Line – 512-239-1795
Toll Free – 1-877-992-8370
Website –
http://www.tceq.state.tx.us/implementation/tox

Study Website:

http://www.tceq.state.tx.us/implementation/tox/research/midlothian.html

ADDITIONAL INFORMATION

Study Issues

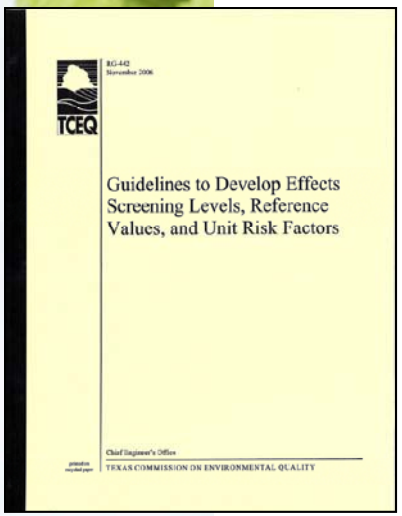
- One VOC sample (2/27/09) for Mountain Peak Elementary School was voided and not analyzed by the lab. Apparently, worn threads on the canister inlet allowed lab air to leak into the canister as pressure was being checked.
- Laboratory results for Cr(VI) samples could not be positively aligned with the collection-specific dates in the 3rd quarter sampling event due to a procedural mistake by the lab; the chain-of-custody form was removed by the laboratory prior to recording the sampling dates.
  - All levels were still below the AMCV
  - In the evaluation the Cr(VI) samples were arranged from highest to lowest and paired with total Cr samples from lowest to highest to be as conservative as possible

Study Conclusions

- Health Evaluation
- Historical Levels
- Accuracy of TCEQ Fixed-Site Monitor
- Location of TCEQ Fixed-Site Monitor
- Regulatory Sampling Schedule
- Seasonal Variation
- Industry and Air Quality
- Schools
- Hexavalent Chromium

Health Evaluation

- Air Monitoring Comparison Values (AMCVs)
  - Screening-level comparison
  - AMCVs are set well below a level at which a health effect would occur
  - *If an AMCV is exceeded, adverse health or welfare effects would not necessarily be expected to result, but a more in-depth review would be triggered.*



Health Evaluation

- All measured concentrations of volatile organic compounds (VOCs) and particulate matter less than 10 micrometers (PM_{10}) metals are not of a health concern.
  - Acrolein and Carbon Disulfide had some short- and long-term exceedances
  - Upon closer review the measured concentrations would not be of a health concern.

Acrolein

Exceedances

- Two Short-Term (AMCV = 1 ppb)

Collocated Monitor	26-Feb-09	2.47 ppb
Water Treatment Plant	3-Jul-09	1.15 ppb

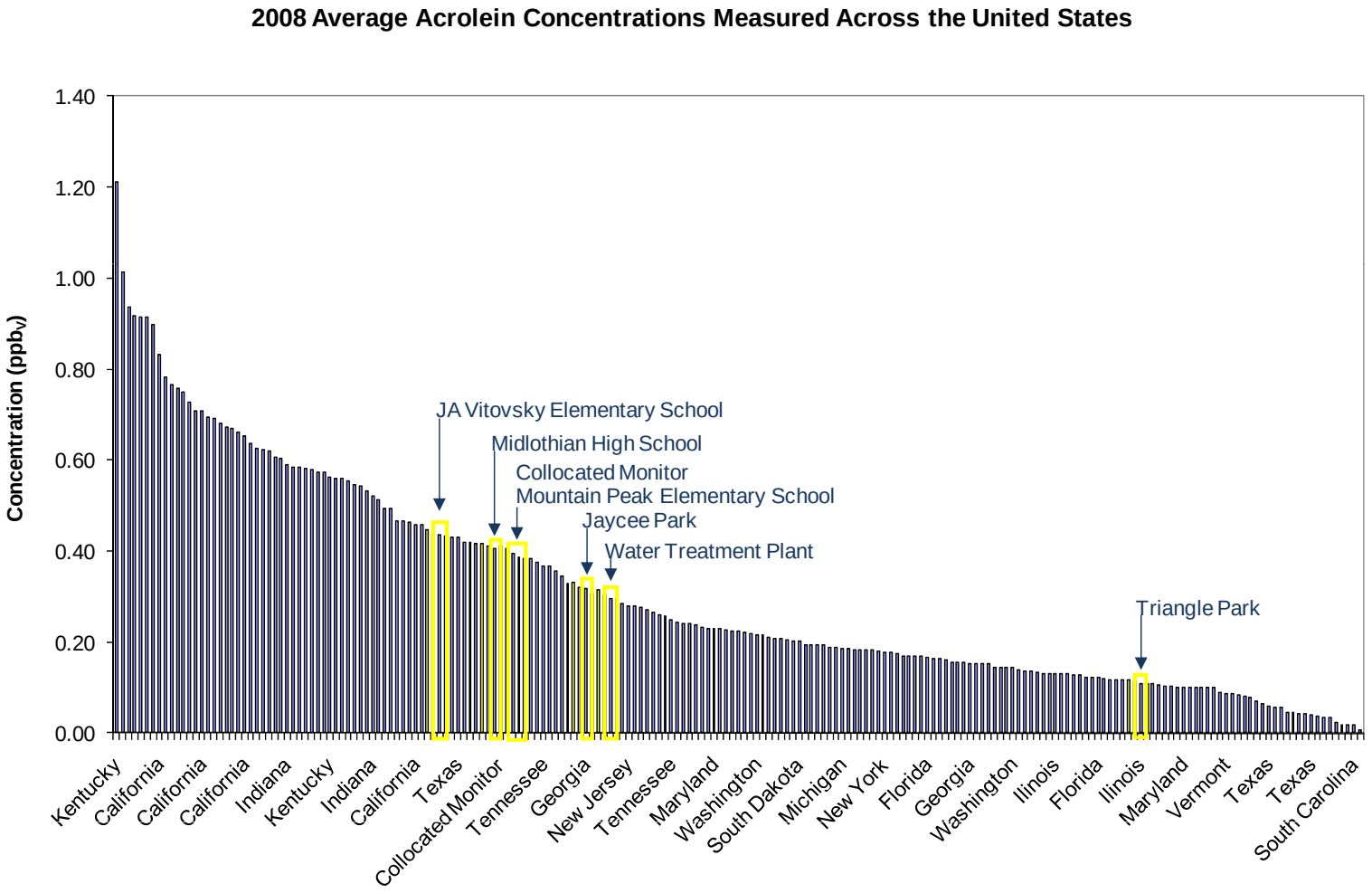
- Three Long-Term (AMCV = 0.1 ppb)
  - Long-term in this case is the overall study average at each location

Collocated Monitor	0.411 ppb
Jaycee Park	0.33 ppb
Water Treatment Plant	0.314 ppm

Acrolein

- Acrolein is a very reactive component in ambient air
- Nasal irritation occurs at levels of 300 ppb or greater
- Levels are within those typical of US
  - Average ambient concentrations range from 0.5 – 3.2 ppb

Acrolein in Midlothian Compared to the US



Carbon Disulfide

- Exceedances
  - One Long-Term (AMCV = 1 ppb)
    - Long-term in this case is the overall study average at each location

Water Treatment Plant	1.69 ppb

  - Zero Short-Term (AMCV = 0.1 ppb)

Carbon Disulfide

- AMCV very conservative in this case
  - 32 – 300 times more conservative than Canada, EPA, CalEPA, & ATSDR
- Levels are within those typical of US
  - Average ambient concentrations range from 0.02 – 14.81 ppb

Carbon Disulfide

Agency	Long-Term Comparison Value Name	Long-Term Comparison Value (ppb) [a]	Point-of-Departure $_{HEC}$ (ppb) [b]	Total Uncertainty Factor	Critical Study and Effect
ATSDR	Chronic Minimal Risk Level (MRL)	300	7,600 LOAEL [NOAEL (median) of 4,100 ppb]	30	Johnson et al. 1983 Nervous system/minimal decrease in nerve conduction velocity
CalEPA	Chronic Reference Exposure Level (REL)	300	2,540 $BMCL_{05}$	10	See above
USEPA	Reference Concentration (RfC)	224	6,304 BMC_{10} [NOAEL (mean) of 5,100 ppb]	30	See above
Health Canada	Tolerable Concentration (TC)	32	1,600 $BMCL_{05}$ [NOEL of 4,160 ppb]	50	See above

ATSDR = Agency for Toxic Substances and Disease Registry

CalEPA = California Environmental Protection Agency

USEPA = United States Environmental Protection Agency

LOAEL = lowest-observed-adverse-effect-level

BMC_{10} = benchmark concentration at the 10% response level

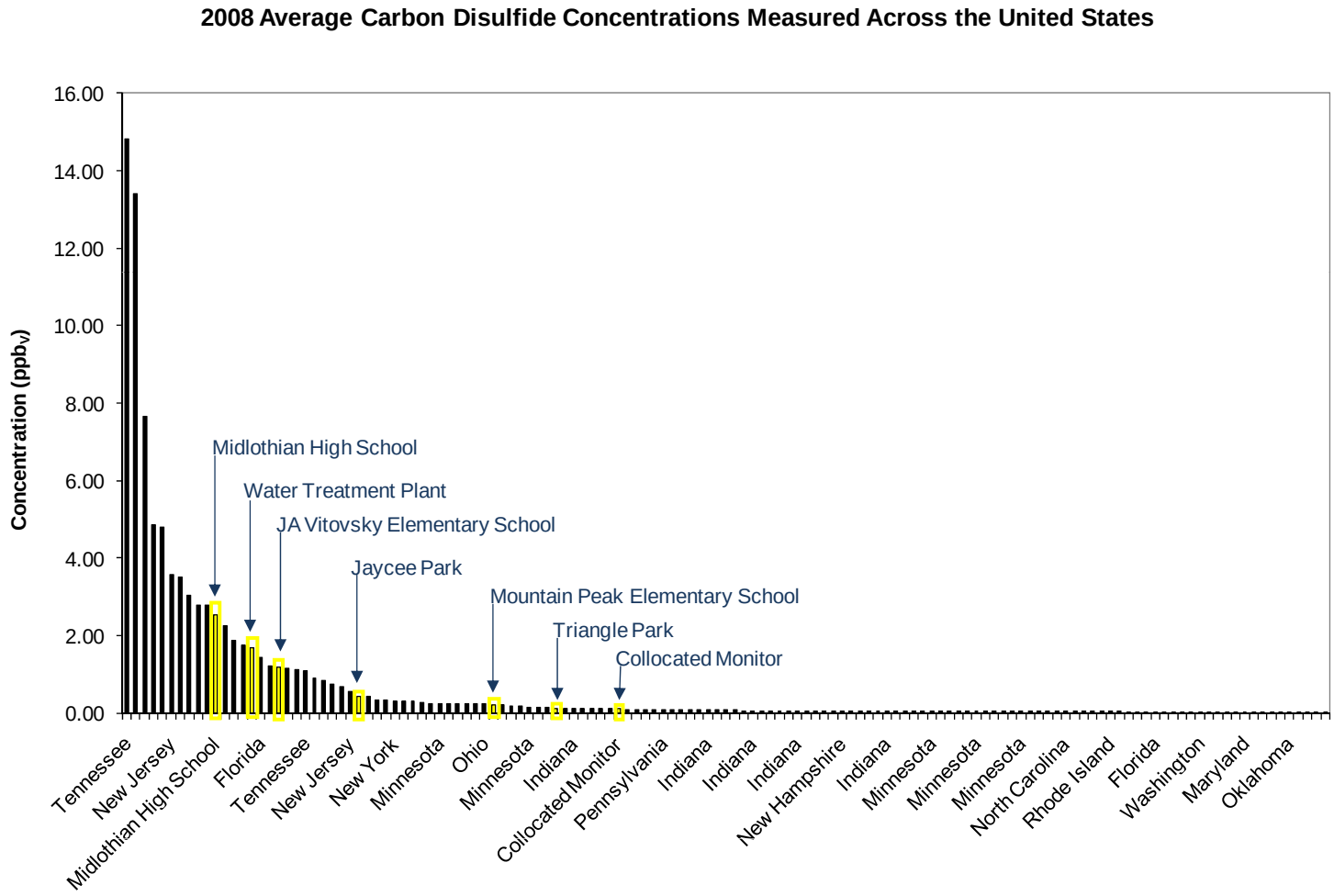
$BMCL_{05}$ = benchmark concentration lower bound at the 5% response level

[a] Comparison values only given in µg/m^3 were converted to ppb using 1 µg/m^3 = 0.32 ppb.

[b] Human equivalent concentration point-of-departure (POD_{HEC}) values only given in µg/m^3 were converted to ppb using 1 µg/m^3 = 0.32 ppb.

TCEQ Long-Term AMCV = **1 ppb**

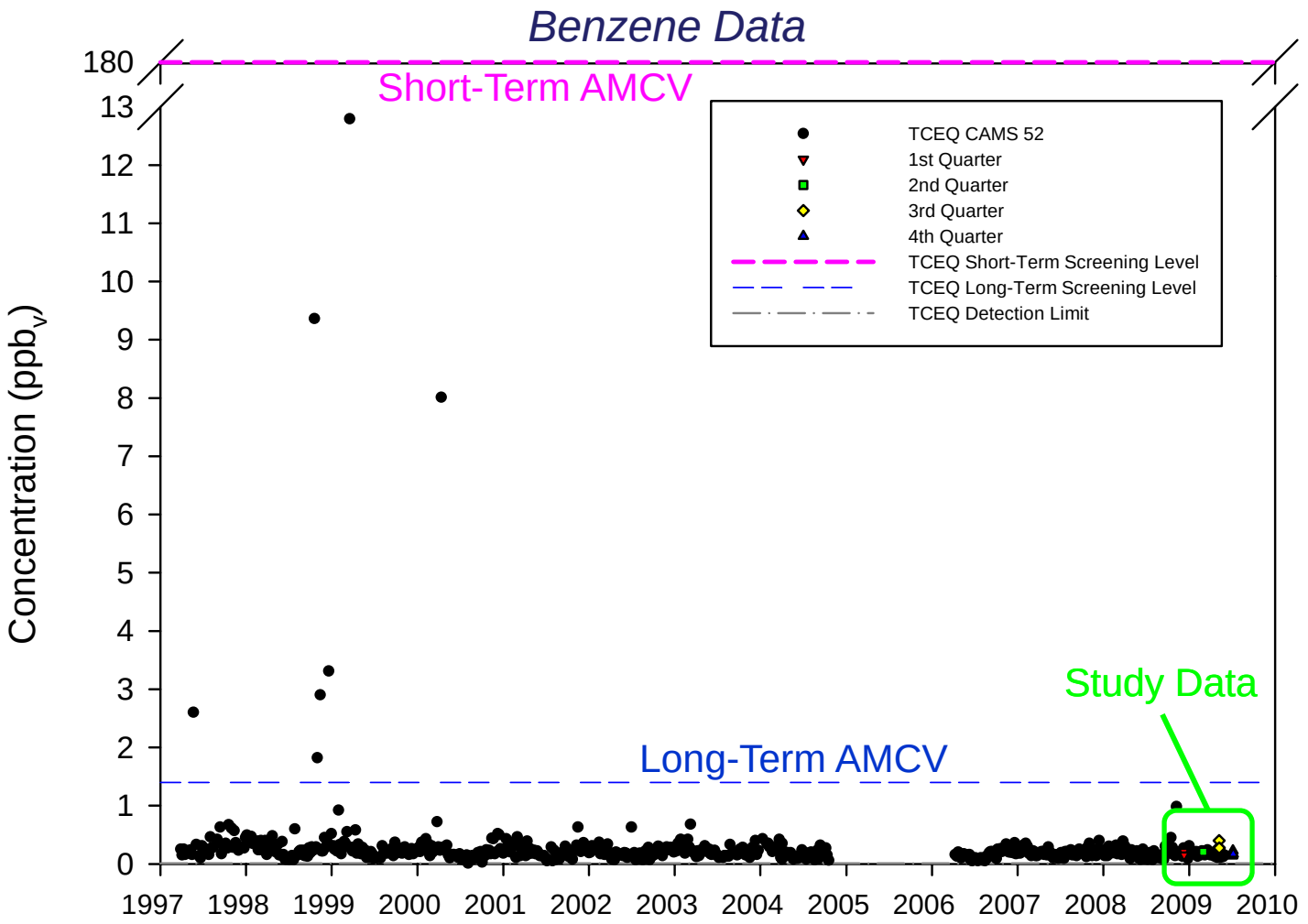
Carbon Disulfide in Midlothian Compared to the US



Historical Levels

- No significant differences found
- Measured concentrations of VOCs and PM_{10} metals are likely typical for this area as compared with historical data.

Historical Levels



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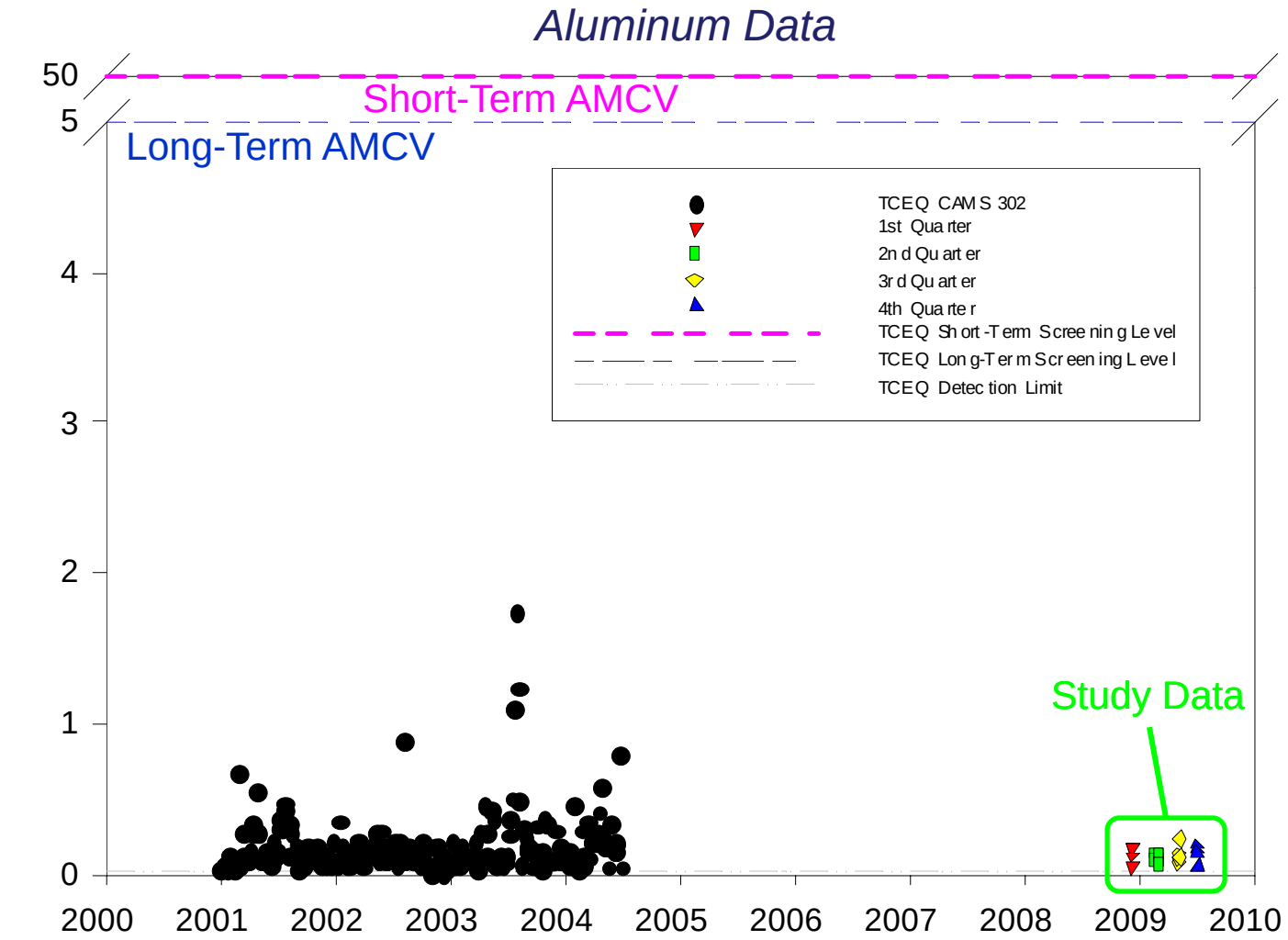
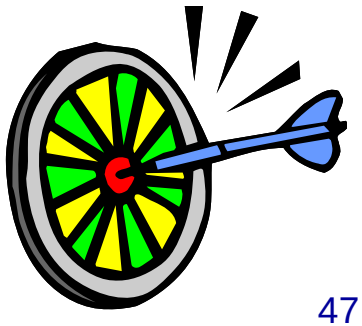


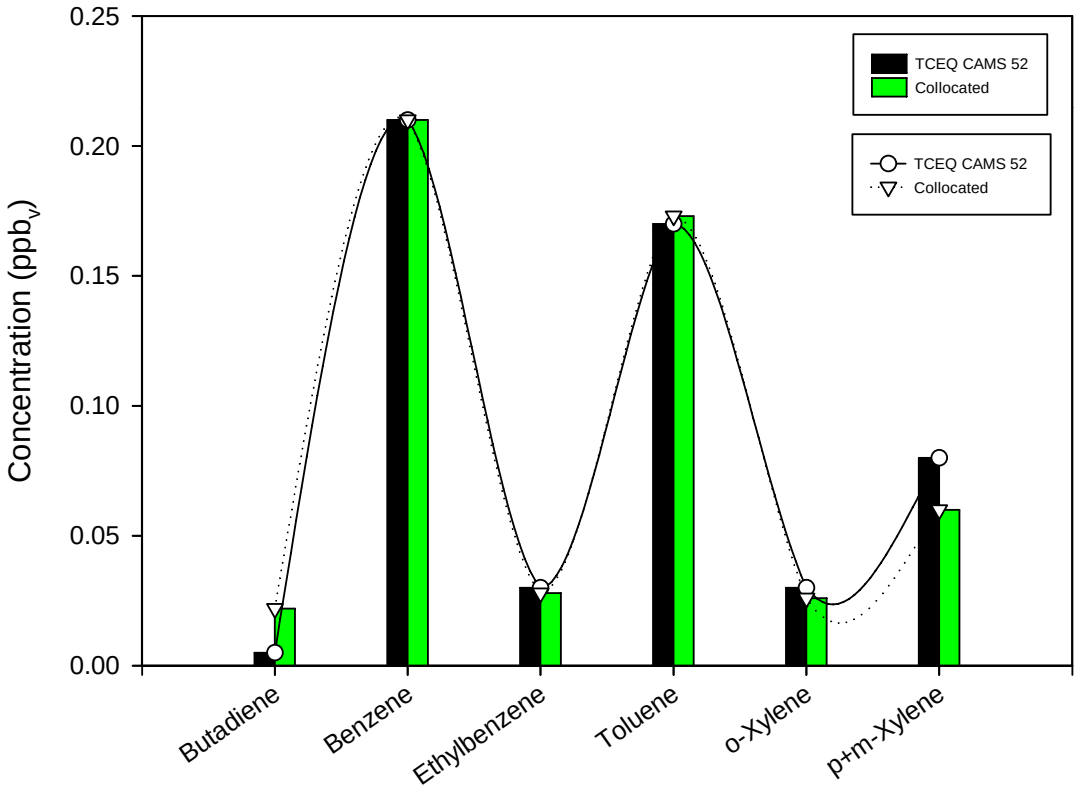
Accuracy of TCEQ Fixed-Site Monitor

- No significant differences between the TCEQ fixed-site monitor and the collocated monitor
- The TCEQ fixed-site monitor is accurately measuring VOC air concentrations at this location, as compared to the third-party collocated data.



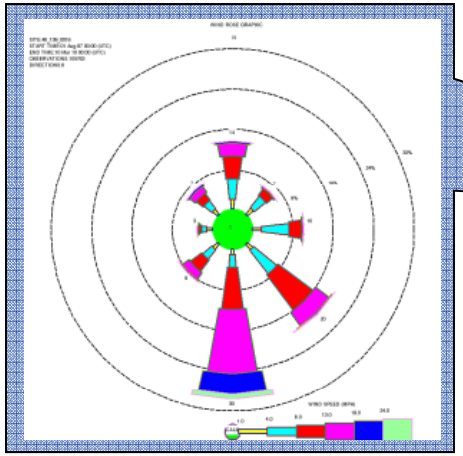
Accuracy of TCEQ Fixed-Site Monitor

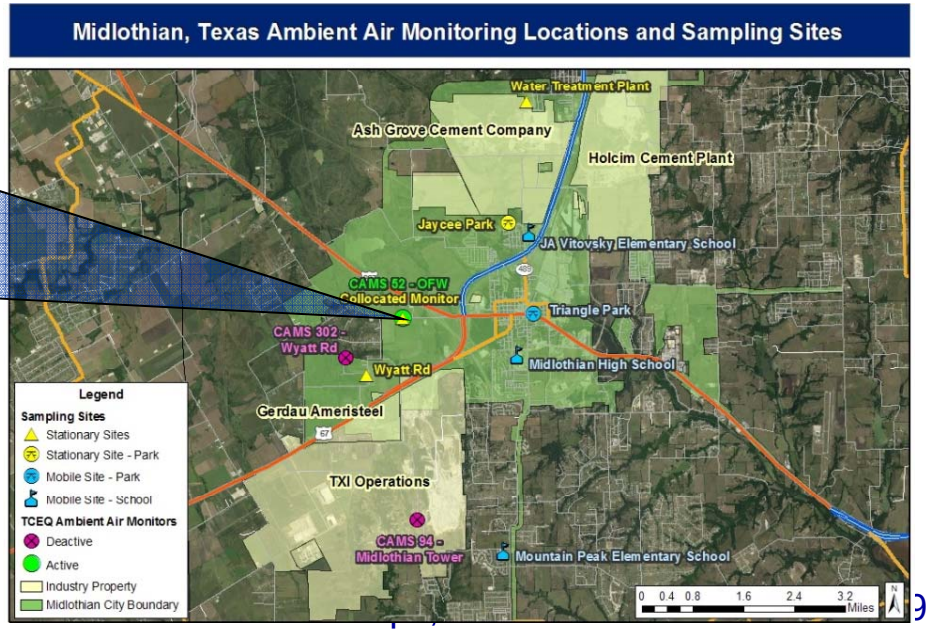
March 2, 2009
Comparison of TCEQ CAMS 52 Ambient Air Monitor
with the Collocated Monitor



Location of TCEQ Fixed-Site Monitor

- The TCEQ fixed-site monitor is positioned downwind of TXI and Gerdau Ameristeel when winds are southerly – the predominant wind direction.





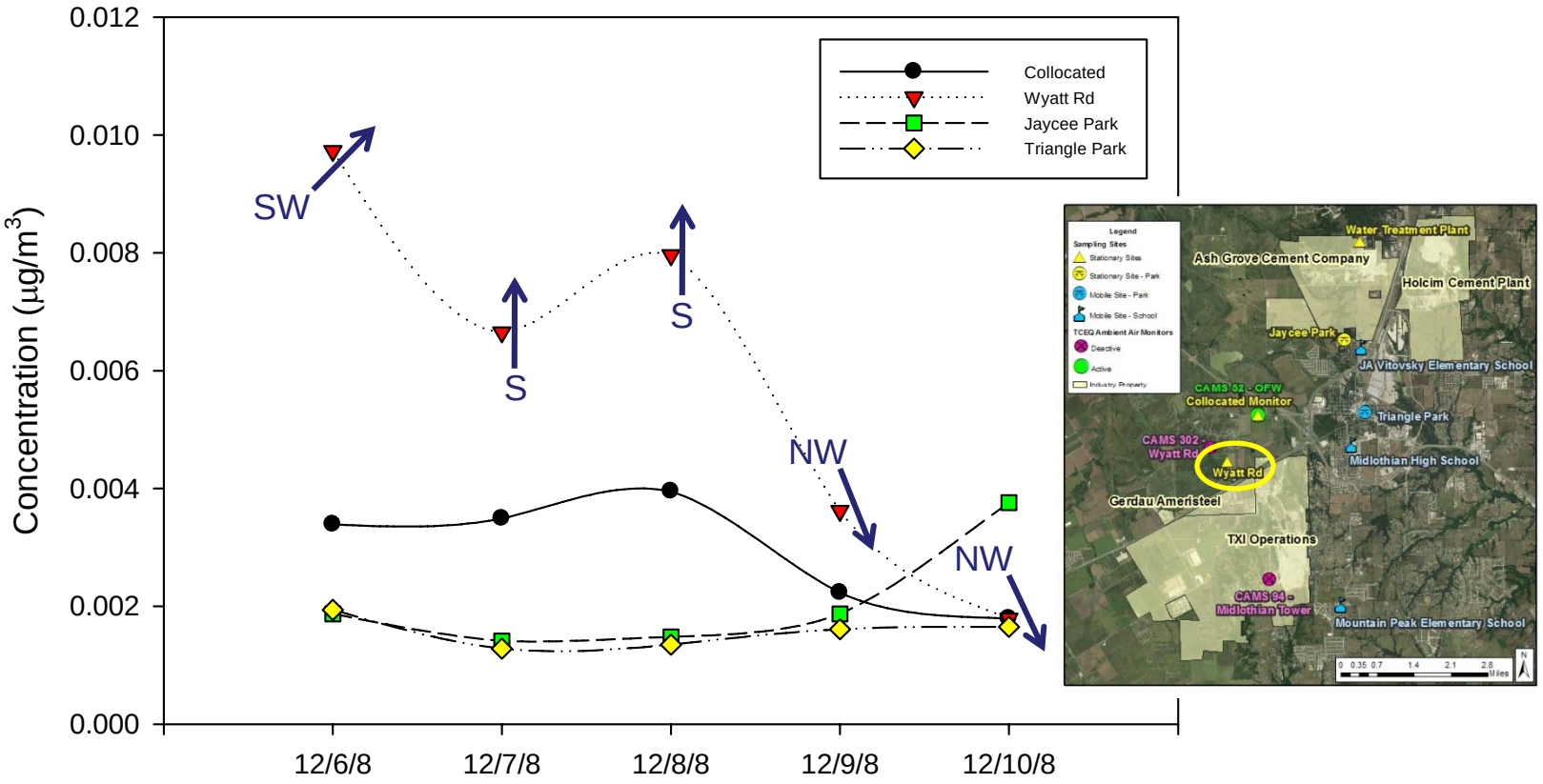
TCEQ Toxicology Division

Location of TCEQ Fixed-Site Monitor

- The impact local industry has on ambient levels of PM_{10} metals is measured by the TCEQ fixed-site monitor.
- This site measures potentially worst-case concentrations of PM_{10} metals.
- Therefore, it is a good indicator of air quality around Midlothian, including schools and parks.

Location of TCEQ Fixed-Site Monitor

1st Quarter Total Chromium PM_{10} Data with Predominant Wind Direction



Regulatory Sampling Schedule

- There are no statistical differences between the regulatory every 6th-day VOC and PM_{10} metals samples and the other sixteen sampled days.

Sampling Dates

December 6 – 10, 2008

February 26 – March 2, 2009

May 5 – 9, 2009

July 3 – 7, 2009

Every 6th-Day Monitoring Dates

December 8, 2008

March 2, 2009

May 7, 2009

July 6, 2009

Seasonal Variation

- The majority of the data indicate that there are no seasonal differences for VOCs and PM_{10} metals in this area.

1st Quarter Total Cr – 0.00339 to 0.00179 μg/m^3	*December 2008*
2nd Quarter Total Cr – 0.00364 to 0.00198 μg/m^3	*February-March 2009*
3rd Quarter Total Cr – 0.00216 to 0.00231 μg/m^3	*May 2009*
4th Quarter Total Cr – 0.00405 to 0.00241 μg/m^3	*July 2009*

Industry and Air Quality

- The highest VOC measurements do not correspond to days when winds put the monitors downwind of industry.
- Sources of benzene, and VOCs in general, are likely not the identified industry in Midlothian.

Industry and Air Quality

- Nearby industry does have a measurable impact on the levels of PM_{10} metals detected in the ambient air in Midlothian.
- However, those contributions are slight, all measured levels are still well below their respective AMCVs, and are not of health concern.

Schools

- Overall concentrations of VOCs and PM_{10} metals at schools and parks are below levels of health concern.
- There are no clear differences in ambient air between weekend and weekdays at schools.

Hexavalent Chromium

- PM_{10} Cr(VI) represents **1.07%** of the total Cr measured in the Midlothian area.
- This is well below the DSHS assumption of 100% Cr(VI) in the draft Health Consultation.

Hexavalent Chromium

	% Cr^{6+} of Total Cr
Highest Daily	7.36%
Highest Daily Average	2.81%
Highest Site Average	1.86%
Overall Average	1.07%