SAT Initiative: Temple Elementary School (Diboll, TX)

This document describes the analysis of air monitoring and other data collected under EPA's initiative to assess potentially elevated air toxics levels at some of our nation's schools. The document has been prepared for technical audiences (e.g., risk assessors, meteorologists) and their management. It is intended to describe the technical analysis of data collected for this school in clear, but generally technical, terms. A summary of this analysis is presented on the page focused on this school on EPA's website (www.epa.gov/schoolair).

I. Executive Summary

- Air monitoring has been conducted at Temple Elementary School as part of the EPA initiative to monitor specific air toxics in the outdoor air around priority schools in 22 states and 2 tribal areas.
- This school was selected for monitoring based on information indicating the potential for elevated ambient concentrations of acrolein in air outside the school. That information included emissions of acrolein in EPA's 2002 National-Scale Air Toxics Assessment (NATA) for a nearby plywood manufacturing facility. Acrolein emissions from this facility have decreased significantly since 2002.
- Air monitoring was performed from September 4, 2009 to March 8, 2010 to assess concentrations of acrolein and other volatile organic compounds (VOCs) in the air. Results of 11 VOC samples were invalidated due to timer malfunction and other issues (see EPA's technical document, Investigation and Resolution of Contamination Problems in the Collection of Volatile Organic Compounds, http://www.epa.gov/schoolair/pdfs/VocTechdocwithappendix1209.pdf). As a result, additional VOC samples were collected starting October 28, 2009, and ending March 8, 2010.
- With the exception of acrolein, measured levels of all other volatile organic compounds and associated longer-term concentration estimates are below levels of significant concern for short-term and long-term exposures.
- EPA will not use the acrolein data in evaluating the potential for health concerns from exposure to air toxics in outdoor air as part of the School Air Toxics Monitoring project. The Agency made this determination after results of a short-term laboratory study raised questions about the consistency and reliability of monitoring results of acrolein. (More information is available at http://www.epa.gov/schoolair/acrolein.html).
- Since that time, EPA has identified several steps that we believe will significantly improve the accuracy of future acrolein sampling and that will provide data that will allow us to understand whether acrolein in the outdoor air may pose a health concern at a particular school. EPA plans to conduct additional sampling for acrolein at this school in early 2011.
- The Texas Commission on Environmental Quality (TCEQ) will continue to oversee industrial facilities in the area through clean air regulatory programs.

II. Background on this Initiative

As part of an EPA initiative to implement Administrator Lisa Jackson's commitment to assess potentially elevated air toxics levels at some of our nation's schools, EPA and state and local air pollution control agencies are monitoring specific (key) air toxics in the outdoor air around priority schools in 22 states and 2 tribal areas (http://www.epa.gov/schoolair/schools.html).

- The schools selected for monitoring include some schools that are near large industries that are sources of air toxics, and some schools that are in urban areas, where emissions of air toxics come from a mix of large and small industries, cars, trucks, buses and other sources.
- EPA selected schools based on information available to us about air pollution in the vicinity of the school, including results of the 2002 National-Scale Air Toxics Assessment (NATA), results from a 2008 USA Today analysis on air toxics at schools, and information from state and local air agencies. The analysis by USA Today involved use of EPA's Risk Screening Environmental Indicators tool and Toxics Release Inventory (TRI) for 2005.
  - Available information had raised some questions about air quality near these schools that EPA concluded merited investigation. In many cases, the information indicated that estimated long-term average concentrations of one or more air toxics were above the upper end of the range that EPA generally considers as acceptable (e.g., above 1-in-10,000 cancer risk for carcinogens).
- Monitors are placed at each school for approximately 60 days, and take air samples on at least 10 different days during that time. The samples are analyzed for specific air toxics identified for monitoring at the school (i.e., key pollutants).[1]
- These monitoring results and other information collected at each school during this initiative allow us to:
  - assess specific air toxics levels occurring at these sites and associated estimates of longer-term concentrations in light of health risk-based criteria for long-term exposures,
  - better understand, in many cases, potential contributions from nearby sources to key air toxics concentrations at the schools,
  - consider what next steps might be appropriate to better understand and address air toxics at the school, and
  - improve the information and methods we will use in the future (e.g., NATA) for estimating air toxics concentrations in communities across the U.S.

Assessment of air quality under this initiative is specific to the air toxics identified for monitoring at each school. This initiative is being implemented in addition to ongoing state, local and national air quality monitoring and assessment activities, including those focused on criteria pollutants (e.g., ozone and particulate matter) or existing, more extensive, air toxics programs.

[1] In analyzing air samples for these key pollutants, samples are also being analyzed for some additional pollutants that are routinely included in the analytical methods for the key pollutants.

Several technical documents prepared for this project provide further details on aspects of monitoring and data interpretation and are available on the EPA website (e.g., www.epa.gov/schoolair/techinfo.html). The full titles of these documents are provided here:

- *School Air Toxics Ambient Monitoring Plan*
- *Quality Assurance Project Plan For the EPA School Air Toxics Monitoring Program*
- *Schools Air Toxics Monitoring Activity (2009), Uses of Health Effects Information in Evaluating Sample Results*

Information on health effects of air toxics being monitored[2] and educational materials describing risk concepts[3] are also available from EPA's website.

III. Basis for Selecting this School and the Air Monitoring Conducted

This school was selected for monitoring because we were interested in evaluating the ambient concentrations of acrolein in air outside the school due to emissions of this pollutant in EPA's 2002 NATA analysis for a nearby plywood manufacturing facility.

Monitoring commenced at this school on September 4, 2009 and continued through March 8, 2010. Due to an issue with VOC monitoring equipment, some VOC results were invalidated (see EPA's technical document, Investigation and Resolution of Contamination Problems in the Collection of Volatile Organic Compounds, at http://www.epa.gov/schoolair/pdfs/VocTechdocwithappendix1209.pdf). Additional VOC samples were collected between October 28, 2009 and March 8, 2010 to ensure that at least 10 valid samples were available for analysis. All VOC results with the exception of acrolein were evaluated for health concerns.

Results of a recent short-term laboratory study have raised questions about the consistency and reliability of monitoring results of acrolein. As a result, EPA will not use these acrolein data in evaluating the potential for health concerns from exposure to air toxics in outdoor air as part of the School Air Toxics Monitoring project (http://www.epa.gov/schoolair/acrolein.html). All sampling methodologies are described in EPA's schools air toxics monitoring plan (http://www.epa.gov/schoolair/techinfo.html).[4]

IV. Monitoring Results and Analysis

A. Background for the SAT Analysis

The majority of schools being monitored in this initiative were selected based on modeling analyses that indicated the potential for annual average air concentrations of some specific (key)

[2] For example, http://www.epa.gov/schoolair/pollutants.html, http://www.epa.gov/ttn/fera/risk_atoxic.html.
[3] For example, http://www.epa.gov/ttn/atw/3_90_022.html, http://www.epa.gov/ttn/atw/3_90_024.html.
[4] In addition to TCEQ staff, a contractor was used to collect some of the samples. The canisters to the analytical laboratory under contract to EPA.

hazardous air pollutants (HAPs or air toxics)[5] to be of particular concern based on approaches that are commonly used in the air toxics program for considering potential for long-term risk. For example, such analyses suggested annual average concentrations of some air toxics were greater than long-term risk-based concentrations associated with an additional cancer risk greater than 10-in-10,000 or a hazard index on the order of or above 10. To make projections of air concentrations, the modeling analyses combined estimates of air toxics emissions from industrial, motor vehicle and other sources, with past measurements of winds, and other meteorological factors that can influence air concentrations, from a weather station in the general area. In some cases, the weather station was very close (within a few miles), but in other cases, it was much further away (e.g., up to 60 miles), which may contribute to quite different conditions being modeled than actually exist at the school. The modeling analyses are intended to be used to prioritize locations for further investigation.

The primary objective of this initiative is to investigate - through monitoring air concentrations of key air toxics at each school over a 2-3 month period - whether levels measured and associated longer-term concentration estimates are of a magnitude, in light of health risk-based criteria, for which follow-up activities may need to be considered. To evaluate the monitoring results consistent with this objective, we developed health risk-based air concentrations (the long-term comparison levels summarized in Appendix A) for the monitored air toxics using established EPA methodology and practices for health risk assessment[6] and, in the case of cancer risk, consistent with the implied level of risk considered in identifying schools for monitoring. Consistent with the long-term or chronic focus of the modeling analyses, based on which these schools were selected for monitoring, we have analyzed the full record of concentrations of air toxics measured at this school, using routine statistical tools, to derive a 95 percent confidence interval[7] for the estimate of the longer-term average concentration of each of these pollutants. In this project, we are reporting all actual numerical values for pollutant concentrations including

[5] The term hazardous air pollutants (commonly called HAPs or air toxics) refers to pollutants identified in section 112(b) of the Clean Air Act which are the focus of regulatory actions involving stationary sources described by CAA section 112 and are distinguished from the six pollutants for which criteria and national ambient air quality standards (NAAQS) are developed as described in section 108. One of the criteria pollutants, lead, is also represented, as lead compounds, on the HAP list.

[6] While this EPA initiative will rely on EPA methodology, practices, assessments and risk policy considerations, we recognize that individual state methods, practices and policies may differ and subsequent analyses of the monitoring data by state agencies may draw additional or varying conclusions.

[7] When data are available for only a portion of the period of interest (e.g., samples not collected on every day during this period), statisticians commonly calculate the 95% confidence interval around the dataset mean (or average) in order to have a conservative idea of how high or low the "true" mean may be. More specifically, this interval is the range in which the mean for the complete period of interest is expected to fall 95% of the time (95% probability is commonly used by statisticians). The interval includes an equal amount of quantities above and below the sample dataset mean. The interval that includes these quantities is calculated using a formula that takes into account the size of the dataset (i.e., the 'n') as well as the amount by which the individual data values vary from the dataset mean (i.e., the "standard deviation"). This calculation yields larger confidence intervals for smaller datasets as well as ones with more variable data points. For example, a dataset including {1.0, 3.0, and 5.0}, results in a mean of 3.0 and a 95% confidence interval of 3.0 +/- ~5 (or -2.0 to 8.0). For comparison purposes, a dataset including {2.5, 3 and 3.5} results in a mean of 3.0 and a 95% confidence interval of 3.0 +/- ~1.2 (or 1.8 to 4.2). The smaller variation within the data in the second set of values causes the second confidence interval to be smaller.

any values below method detection limit (MDL).[8] Additionally, a value of 0.0 is used when a measured pollutant has no value detected (ND). The projected range for the longer-term concentration estimate for each chemical (most particularly the upper end of the range) is compared to the long-term comparison levels. These long-term comparison levels conservatively presume continuous (all-day, all-year) exposure over a lifetime. The analysis of the air concentrations also includes a consideration of the potential for cumulative multiple pollutant impacts.[9] In general, where the monitoring results indicate estimates of longer-term average concentrations that are above the comparison levels - i.e., above the cancer-based comparison levels or notably above the noncancer-based comparison levels - we will consider the need for follow-up actions such as:

- → Additional monitoring of air concentrations and/or meteorology in the area,
- → Evaluation of potentially contributing sources to help us confirm their emissions and identify what options (regulatory and otherwise) may be available to us to achieve emissions reductions, and
- → Evaluation of actions being taken or planned nationally, regionally or locally that may achieve emission and/or exposure reductions. An example of this would be the actions taken to address the type of ubiquitous emissions that come from mobile sources.

We have further analyzed the dataset to describe what it indicates in light of some other criteria and information commonly used in prioritizing state, local and national air toxics program activities. State, local and national programs often develop long-term monitoring datasets in order to better characterize pollutants near particular sources. The 2-3 month dataset developed under this initiative will be helpful to those programs in setting priorities for longer-term monitoring projects. The intent of this analysis is to make this 2-3 month monitoring dataset as useful as possible to state, local and national air toxics programs in their longer-term efforts to improve air quality nationally. To that end, this analysis:

- → Describes the air toxics measurements in terms of potential longer-term concentrations, and, as available, compares the measurements at this school to monitoring data from national monitoring programs.
- → Describes the meteorological data by considering conditions on sampling days as compared to those over all the days within the 2-3 month monitoring period and what conditions might be expected over the longer-term (as indicated, for example, by information from a nearby weather station).
- → Describes available information regarding activities and emissions at the nearby source(s) of interest, such as that obtained from public databases such as TRI and/or consultation with the local air pollution authority.

[8] Method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99% confidence that the pollutant concentration is greater than zero and is determined from the analysis of a sample in a given matrix containing the pollutant.

[9] As this analysis of a 2-3 month monitoring dataset is not intended to be a full risk assessment, consideration of potential multiple pollutant impacts may differ among sites. For example, in instances where no individual pollutant appears to be present above its comparison level, we will also check for the presence of multiple pollutants at levels just below their respective comparison levels (giving a higher priority to such instances).

B. Chemical Concentrations

We developed two types of long-term health risk-related comparison levels (summarized in Appendix A below) to address our primary objective. The primary objective is to investigate through the monitoring data collected for key pollutants at the school, whether pollutant levels measured and associated longer-term concentration estimates are elevated enough in comparison with health risk-based criteria to indicate that follow-up activities be considered. These comparison levels conservatively presume continuous (all-day, all-year) exposure over a lifetime.

In developing or identifying these comparison levels, we have given priority to use of relevant and appropriate air standards and EPA risk assessment guidance and precedents.[10] These levels are based upon health effects information, exposure concentrations and risk estimates developed and assessed by EPA, the U.S. Agency for Toxic Substances and Disease Registry, and the California EPA. These agencies recognize the need to account for potential differences in sensitivity or susceptibility of different groups (e.g., asthmatics) or lifestages/ages (e.g., young children or the elderly) to a particular pollutant's effects so that the resulting comparison levels are relevant for these potentially sensitive groups as well as the broader population.

In addition to evaluating individual pollutants with regard to their corresponding comparison levels, we also considered the potential for cumulative impacts from multiple pollutants in cases where individual pollutant levels fall below the comparison levels but where multiple pollutant mean concentrations are within an order of magnitude of their comparison levels.

Key findings drawn from the information on chemical concentrations and the considerations discussed below include:

- Results of a recent short-term laboratory study have raised questions about the consistency and reliability of monitoring results of acrolein. As a result, EPA will not use these acrolein data in evaluating the potential for health concerns from exposure to air toxics in outdoor air as part of the School Air Toxics Monitoring project.
- The air sampling data and related longer-term concentration estimates for the other volatile organic compounds monitored are below levels of significant concern.

<u>Acrolein, the key pollutant:</u>

- Results of a recent short-term laboratory study have raised questions about the consistency and reliability of monitoring results of acrolein. As a result, EPA will not use these acrolein data in evaluating the potential for health concerns from exposure to air toxics in outdoor air as part of the School Air Toxics Monitoring project.

[10] This is described in detail in *Schools Air Toxics Monitoring Activity (2009), Uses of Health Effects Information in Evaluating Sample Results*

Other Air Toxics:

- Do the monitoring data indicate elevated levels of any other air toxics (or HAPs) that pose significant long-term health concerns?

  → The monitoring data show low levels of the other HAPs monitored, with longer-term concentration estimates for these HAPs below their long-term comparison levels (Appendix C). Additionally each individual measurement for these pollutants is below the individual sample screening level[10] for that pollutant.

Multiple Pollutants:

- Do the data collected for the air toxics monitored indicate the potential for other monitored pollutants to be present at levels that in combination with the key pollutant levels indicate an increased potential for cumulative impacts of significant concern (e.g., that might warrant further investigation)?

  → The data collected for the other air toxics and the associated longer-term concentration estimates do not pose significant concerns for cumulative health risk from these pollutants (Appendix C).[11]

C. Wind and Other Meteorological Data

At each school monitored as part of this initiative, we are collecting meteorological data, minimally for wind speed and direction, during the sampling period. Additionally, we have identified the nearest National Weather Service (NWS) station at which a longer record is available.

In reviewing these data at each school in this initiative, we are considering if these data indicate that the general pattern of winds on our sampling dates are significantly different from those occurring across the full sampling period or from those expected over the longer-term. Additionally, we are noting, particularly for school sites where the measured chemical concentrations show little indication of influence from a nearby source, whether wind conditions on some portion of the sampling dates were indicative of a potential to capture contributions from the nearby "key" source in the air sample collected.

The meteorological station at Temple Elementary School collected wind speed and wind direction measurements beginning on August 18, 2009, continuing through the sampling period (October 28, 2009-March 8, 2010), and ending on March 11, 2010. As a result, on-site data for these meteorological parameters are available for all dates of sample collection, and also for a period before and after the sampling period, producing a continuous record of approximately seven months of on-site meteorological data. The meteorological data collected at the school site on sampling days are presented in Table 1 and Figure 1.

[11] We note that this initiative is focused on investigation for a school-specific set of key pollutants indicated by previous analyses (and a small set of others for which measurements are obtained in the same analysis). Combined impacts of pollutants or stressors other than those monitored in this project is a broader area of consideration in other EPA activities. General information on additional air pollutants is available at http://www.epa.gov/air/airpollutants.html

The nearest NWS station is at Angelina County Airport in Diboll, TX. This station is approximately 4.4 miles northeast of the school. Measurements taken at that station include wind, temperature, and precipitation. These are also presented in Table 1 and Figure 1.

Key findings drawn from this information and the considerations discussed below include:

- While sampling results for the key pollutant acrolein are not being evaluated, the sampling results for several of the other pollutants monitored and the on-site wind data indicate that some of the air samples were collected on days when the nearby key source was contributing to conditions at the school location.
- The wind patterns at the monitoring site on sampling days are similar to those observed during the entire sampling period.
- Our ability to provide a confident characterization of the wind flow patterns at the monitoring site over the long-term is limited as the wind flow patterns at the NWS site at the Angelina County Airport are only somewhat similar to those at the school location.
- We lack long-term wind data at the monitoring site, and the wind patterns at the NWS site during the sampling period are not similar to the historical long-term wind flow pattern at that location. This suggests that, on a regional scale, the 5-month sampling period may not be representative of year-round wind patterns.

- What is the direction of the key source of acrolein emissions in relation to the school location?
  - → The nearby industrial facility emitting the key pollutant into the air (described in section III above) lies less than one mile north of the school.
  - → Using the property boundaries of the full facility (in lieu of information regarding the location of specific sources of acrolein emissions at the facility), we have identified an approximate range of wind directions to use in considering the potential influence of this facility on air concentrations at the school.
  - → This general range of wind directions, from approximately 326-34 degrees, is referred to here as the expected zone of source influence (ZOI).

- On days the air samples were collected, how often did wind come from the direction of the key source?
  - → There were nine days out of twelve sampling days in which a portion of the winds were from the expected ZOI (Table 1).

- How do wind patterns on the air monitoring days compare to those across the complete monitoring period and what might be expected over the longer-term at the school location?
  - → Wind patterns across the air monitoring days appear generally similar to those observed over the record of on-site meteorological data during the sampling period, particularly with regard to the expected ZOI.

→ We note that wind patterns at the nearest NWS station at Angelina County Airport during the sampling period are somewhat similar to on-site wind patterns, but are not similar to those recorded at the NWS station over the long-term (2002-2007 period; Figure 1). Therefore, there is some uncertainty as to whether the general wind patterns at the school location for longer periods would be similar to the general wind patterns at the Angelina County Airport (see below).

- How do wind patterns at the school compare to those at the Angelina County Airport NWS station, particularly with regard to prevalent wind directions and the direction of the key source?
  → During the sampling period for which data are available both at the school site and at the reference NWS station (approximately 7 months), prevalent winds at the school site are predominantly from the north-northwest and east-southeast, while those at the NWS station are somewhat more from the northwestern and the southeastern quadrants. The windroses for the two sites during the sampling period (Figure 1) show differences in wind flow patterns.

V. Key Source Information

- Was the source operating as usual during the monitoring period?
  – The nearby source of acrolein (described in section III above) has an operating permit issued by the TCEQ that includes operating requirements.[12]
  – Acrolein emissions from the key source have decreased significantly from the estimate relied upon in previous modeling analyses for this area (2002 NATA). The 2002 NATA emissions estimate of approximately 13 tons per year is consistent with the TRI emissions from 1996 to 2006. Information from the source indicates that 2007 and 2008 emissions were approximately 10 and 8.5 tons per year, respectively.

VI. Integrated Summary and Next Steps

A. Summary of Key Findings

1. What is the key HAP for this school?
   → Acrolein is the key HAP for this school, identified based on emissions information considered in identifying the school for monitoring.

2. Do the data collected at this school indicate an elevated level of concern, as implied by information that led to identifying this school for monitoring?
   → Results of a recent short-term laboratory study have raised questions about the consistency and reliability of monitoring results of acrolein. As a result, EPA will not use these acrolein data in evaluating the potential for health

[12] Operating permits, which are issued to air pollution sources under the Clean Air Act, are described at: http://www.epa.gov/air/oaqps/permits/

concerns from exposure to air toxics in outdoor air as part of the School Air Toxics Monitoring project (http://www.epa.gov/schoolair/acrolein.html).

→ The air sampling data and related longer-term concentration estimates for the other volatile organic compounds monitored are below levels of significant concern for short-term and long-term exposures.

3. Are there indications, e.g., from the meteorological or other data, that the sample set may not be indicative of longer-term air concentrations? Would we expect higher (or lower) concentrations at other times of year?
   → The data we have collected appear to reflect air concentrations during the entire monitoring period, with no indications from the on-site meteorological data that the sampling day conditions were inconsistent with conditions overall during this period.
   → Among the data collected for this site, we have none that would indicate generally higher (or lower) concentrations during other times of year. We lack long-term meteorological data at the school location, and the wind flow patterns at the nearest NWS station during the sampling period do not appear to be representative of long-term wind flow at that site. This limits our ability to confidently predict longer-term wind patterns at the school (which might provide further evidence relevant to concentrations during other times).

B. Next Steps for Key Pollutants

- EPA has identified several steps that we believe will significantly improve the accuracy of future acrolein sampling and that will provide data that will allow us to understand whether acrolein in the outdoor air may pose a health concern at a particular school. EPA plans to conduct additional sampling for acrolein at this school in early 2011.
- The Texas Commission on Environmental Quality (TCEQ) will continue to oversee industrial facilities in the area through clean air regulatory programs.

VII. Figures and Tables

A. Tables

1. Temple Elementary School – Meteorological Data.

B. Figures

1. Temple Elementary School (Diboll, TX) and Angelina County Airport – Wind Information.

VIII. Appendices

A. Summary Description of Long-term Comparison Levels.

B. National Air Toxics Trends Stations Measurements (2004-2008).

C. Analysis of Other (non-key) Air Toxics Monitored at the School and Multiple-pollutant Considerations.

D. Temple Elementary School Pollutant Concentrations.

E. Windroses for Angelina County Airport NWS Station.

Table 1. Temple Elementary School - Meteorological Data.

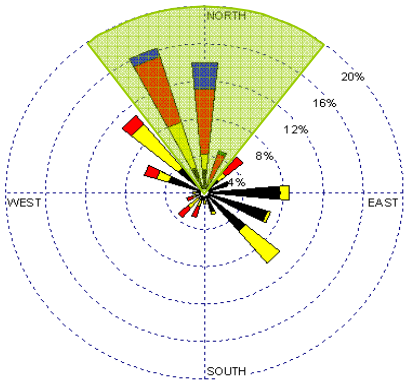
Parameter	Units	10/28/2009	12/2/2009	12/8/2009	1/7/2010	1/14/2010	1/25/2010	2/1/2010	2/11/2010	2/16/2010	2/22/2010	3/1/2010	3/8/2010
% Hours w/Wind Direction from Expected ZOI[a]	%	0.0	50.0	41.7	79.2	0.0	25.0	8.3	50.0	50.0	79.2	83.3	0.0
Wind Speed (avg. of hourly speeds)	mph	4.0	5.0	6.3	9.5	3.0	3.0	2.1	6.0	4.0	7.7	7.5	8.2
Wind Direction (avg. of unitized vector)[b]	deg.	120.4	324.9	284.0	353.3	100.4	315.4	87.5	24.8	328.9	10.2	347.8	179.1
% of Hours with Speed below 2 knots	%	16.7	8.3	12.5	4.2	16.7	62.5	62.5	0.0	50.0	0.0	4.2	0.0
Daily Average Temperature	° F	65.5	43.6	54.6	36.7	52.4	47.2	44.4	34.5	39.7	42.5	45.1	63.7
Daily Precipitation	inches	0.01	0.00	0.00	0.22	0.04	0.00	0.01	0.97	0.01	0.11	0.18	1.08

All precipitation and temperature data were from the Angelina County Airport NWS Station.

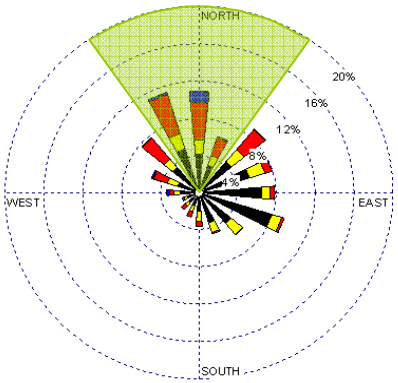
[a] Based on count of hours for which vector wind direction is from expected zone of influence.

[b] Wind direction for each day is represented by values derived by scalar averaging of hourly estimates that were produced (by wind instrumentation's logger) as unitized vectors (specified as degrees from due north).

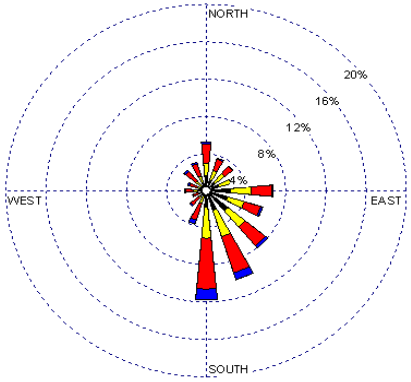
Figure 1. Temple Elementary School (Diboll, TX) and Angelina County Airport - Wind Information.



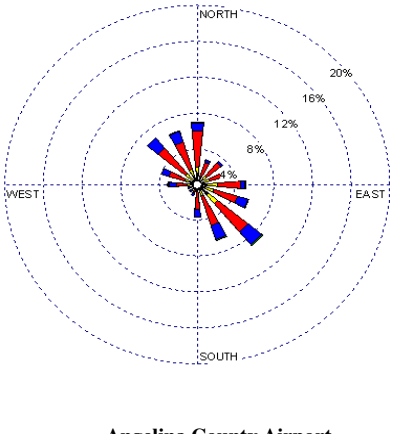
Temple Elementary School Composite Hourly Windrose on Sample Days (Oct. 28, 2009-Mar. 8, 2010)



Temple Elementary School Composite Hourly Windrose Across Sampling Period (Aug. 18, 2009-Mar. 11, 2010)



Angelina County Airport NWS Station Composite Hourly Windrose, 2002-2007[1]



Angelina County Airport NWS Station Across Sampling Period (Aug. 18, 2009-Mar. 11, 2010)[1]

[1]Angelina County Airport NWS Station (WBAN 93987) is 4.37 miles from Temple Elementary School.

Expected Zone of Source Influence

Appendix A. Summary Description of Long-term Comparison Levels

In addressing the primary objective identified above, to investigate through the monitoring data collected for key pollutants at the school whether levels are of a magnitude, in light of health risk-based criteria, to indicate that follow-up activities be considered, we developed two types of long-term health risk-related comparison levels. These two types of levels are summarized below.[13]

Cancer-based Comparison Levels:

- For air toxics where applicable, we developed cancer risk-based comparison levels to help us consider whether the monitoring data collected at the school indicate the potential for concentrations to pose incremental cancer risk above the range that EPA generally considers acceptable in regulatory decision-making to someone exposed to those concentrations continuously (24 hours a day, 7 days a week) over an entire lifetime.[14] This general range is from 1 to 100 in a million.
- Air toxics with long-term mean concentrations below one one-hundredth of this comparison level would be below a comparably developed level for 1-in-a-million risk (which is the lower bound of EPA's traditional acceptable risk range). Such pollutants, with long-term mean concentrations below the Agency's traditional acceptable risk range, are generally considered to pose negligible risk.
- Air toxics with long-term mean concentrations above the acceptable risk range would generally be a priority for follow-up activities. In this evaluation, we compare the upper 95% confidence limit on the mean concentration to the comparison level. Pollutants for which this upper limit falls above the comparison level are fully discussed in the school monitoring report and may be considered a priority for potential follow-up activities in light of the full set of information available for that site.
- Situations where the summary statistics for a pollutant are below the cancer-based comparison level but above 1% of that level are fully discussed in Appendix C.

[13] These comparison levels are described in more detail *Schools Air Toxics Monitoring Activity (2009), Uses of Health Effects Information in Evaluating Sample Results*.

[14] While no one would be exposed at a school for 24 hours a day, every day for an entire lifetime, we chose this worst-case exposure period as a simplification for the basis of the comparison level in recognition of other uncertainties in the analysis. Use of continuous lifetime exposure yields a lower, more conservative, comparison level than would use of a characterization more specific to the school population (e.g., 5 days a week, 8-10 hours a day for a limited number of years).

Noncancer-based Comparison Levels:

- To consider concentrations of air toxics other than lead (for which we have a national ambient air quality standard) with regard to potential for health effects other than cancer, we derived noncancer-based comparison levels using EPA chronic reference concentrations (or similar values). A chronic reference concentration (RfC) is an estimate of a long-term continuous exposure concentration (24 hours a day, every day) without appreciable risk of adverse effect over a lifetime.[15] This differs from the cancer risk-based comparison level in that it represents a concentration without appreciable risk *vs* a risk-based concentration.
- In using this comparison level in this initiative, the upper end of the 95% confidence limit on the mean is compared to the comparison level. Air toxics for which this upper confidence limit is near or below the noncancer-based comparison level (i.e., those for which longer-term average concentration estimates are below a long-term health-related reference concentration) are generally of low concern and will generally be considered a low priority for follow-up activity. Pollutants for which the 95% confidence limits extend appreciably above the noncancer-based comparison level are fully discussed below and may be considered a priority for follow-up activity if indicated in light of the full set of information available for the pollutant and the site.
- For lead, we set the noncancer-based comparison level equal to the level of the recently revised national ambient air quality standard (NAAQS). It is important to note that the NAAQS for lead is a 3-month rolling average of lead in total suspended particles. Mean levels for the monitoring data collected in this initiative that indicate the potential for a 3-month average above the level of the standard will be considered a priority for consideration of follow-up actions such as siting of a NAAQS monitor in the area.

In developing or identifying these comparison levels, we have given priority to use of relevant and appropriate air standards and EPA risk assessment guidance and precedents. These levels are based upon health effects information, exposure concentrations and risk estimates developed and assessed by EPA, the U.S. Agency for Toxic Substances and Disease Registry, and the California EPA. These agencies recognize the need to account for potential differences in sensitivity or susceptibility of different groups (e.g., asthmatics) or lifestages/ages (e.g., young children or the elderly) to a particular pollutant's effects so that the resulting comparison levels are relevant for these potentially sensitive groups as well as the broader population.

[15] EPA defines the RfC as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It can be derived from a NOAEL, LOAEL, or benchmark concentration, with uncertainty factors generally applied to reflect limitations of the data used. Generally used in EPA's noncancer health assessments." http://www.epa.gov/ncea/iris/help_gloss.htm#r

Appendix B. National Air Toxics Trends Stations Measurements (2004-2008).[a]

Pollutant	Units	# Samples Analyzed	% Detections	Maximum	Arithmetic Mean[b]	Geometric Mean	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
Acetonitrile	µg/m^3	1,804	69%	542.30	3.55	0.72	ND	ND	0.27	0.76	8.60
Acrylonitrile	µg/m^3	3,673	31%	5.51	0.06	0.10	ND	ND	ND	0.03	0.33
Benzene	µg/m^3	6,313	94%	10.19	1.03	0.84	ND	0.48	0.80	1.31	2.81
Benzyl chloride	µg/m^3	3,046	9%	2.49	0.01	0.05	ND	ND	ND	ND	0.05
Bromoform	µg/m^3	2,946	4%	1.18	0.01	0.16	ND	ND	ND	ND	ND
Bromomethane	µg/m^3	5,376	61%	120.76	0.11	0.05	ND	ND	0.03	0.05	0.12
Butadiene, 1,3-	µg/m^3	6,427	67%	15.55	0.10	0.09	ND	ND	0.05	0.13	0.38
Carbon disulfide	µg/m^3	1,925	91%	46.71	2.32	0.25	ND	0.03	0.09	0.96	12.65
Carbon tetrachloride	µg/m^3	6,218	86%	1.76	0.52	0.58	ND	0.47	0.57	0.65	0.87
Chlorobenzene	µg/m^3	5,763	30%	1.10	0.02	0.04	ND	ND	ND	0.01	0.11
Chloroethane	µg/m^3	4,625	37%	0.58	0.02	0.04	ND	ND	ND	0.03	0.08
Chloroform	µg/m^3	6,432	73%	48.05	0.17	0.14	ND	ND	0.10	0.17	0.61
Chloromethane	µg/m^3	5,573	95%	19.70	1.17	1.20	ND	1.03	1.18	1.36	1.68
Chloroprene	µg/m^3	2,341	11%	0.17	<0.01	0.03	ND	ND	ND	ND	0.02
Dichlorobenzene, *p*-	µg/m^3	5,409	60%	13.65	0.19	0.16	ND	ND	ND	0.18	0.90
Dichloroethane, 1,1-	µg/m^3	5,670	16%	0.36	0.01	0.02	ND	ND	ND	ND	0.02
Dichloroethylene, 1,1-	µg/m^3	5,480	19%	0.44	0.01	0.02	ND	ND	ND	ND	0.04
Dichloromethane	µg/m^3	6,206	82%	214.67	0.59	0.34	ND	0.14	0.28	0.49	1.35
Dichloropropane,1,2-	µg/m^3	6,225	17%	1.80	0.01	0.03	ND	ND	ND	ND	0.04
Dichloropropylene, c*is* -1,3-	µg/m^3	4,705	18%	0.80	0.01	0.05	ND	ND	ND	ND	0.11
Dichloropropylene, *trans* -1,3-	µg/m^3	4,678	18%	1.13	0.02	0.05	ND	ND	ND	ND	0.11
Ethyl acrylate	µg/m^3	1,917	1%	0.08	<0.01	0.04	ND	ND	ND	ND	ND
Ethylbenzene	µg/m^3	6,120	84%	8.84	0.42	0.32	ND	0.10	0.29	0.53	1.33
Ethylene dibromide	µg/m^3	5,646	19%	4.15	0.01	0.05	ND	ND	ND	ND	0.05
Ethylene dichloride	µg/m^3	6,143	38%	4.49	0.03	0.05	ND	ND	ND	0.04	0.09
Hexachlorobutadiene	µg/m^3	3,727	20%	0.97	0.03	0.10	ND	ND	ND	ND	0.18
Methyl chloroform	µg/m^3	5,944	73%	3.17	0.09	0.10	ND	ND	0.08	0.11	0.20
Methyl isobutyl ketone	µg/m^3	2,936	60%	2.95	0.11	0.09	ND	ND	0.02	0.12	0.49
Methyl methacrylate	µg/m^3	1,917	9%	14.05	0.13	0.49	ND	ND	ND	ND	0.53
Methyl *tert*- butyl ether	µg/m^3	4,370	41%	20.50	0.28	0.12	ND	ND	ND	0.04	1.53
Styrene	µg/m^3	6,080	70%	27.22	0.16	0.11	ND	ND	0.05	0.16	0.60

Appendix B. National Air Toxics Trends Stations Measurements (2004-2008).[a]

Pollutant	Units	# Samples Analyzed	% Detections	Maximum	Arithmetic Mean[b]	Geometric Mean	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
Tetrachloroethane, 1,1,2,2-	µg/m^3	5,952	20%	2.47	0.02	0.04	ND	ND	ND	ND	0.07
Tetrachloroethylene	µg/m^3	6,423	71%	42.12	0.28	0.20	ND	ND	0.13	0.27	0.88
Toluene	µg/m^3	5,947	95%	482.53	2.46	1.54	0.01	0.70	1.51	3.05	7.42
Trichlorobenzene, 1,2,4-	µg/m^3	4,301	21%	45.27	0.07	0.10	ND	ND	ND	ND	0.16
Trichloroethane,1,1,2-	µg/m^3	5,210	19%	5.89	0.01	0.04	ND	ND	ND	ND	0.05
Trichloroethylene	µg/m^3	6,410	46%	6.50	0.05	0.07	ND	ND	ND	0.05	0.22
Vinyl chloride	µg/m^3	6,284	18%	1.61	0.01	0.02	ND	ND	ND	ND	0.03
Xylene, *m/p-*	µg/m^3	4,260	90%	21.41	1.12	0.71	ND	0.26	0.69	1.43	3.65
Xylene, *o-*	µg/m^3	6,108	83%	9.21	0.41	0.30	ND	0.09	0.24	0.52	1.39

ND No results of this chemical were registered by the laboratory analytical equipment.

[a] The summary statistics in this table represent the range of actual daily HAP measurement values taken at NATTS sites from 2004 through 2008. These data were extracted from AQS in summer 2008 and 2009. During the time period of interest, there were 28 sites measuring VOCs, carbonyls, metals, and hexavalent chromium. We note that some sites did not sample for particular pollutant types during the initial year of the NATTS Program, which was 2004. Most of the monitoring stations in the NATTS network are located such that they are not expected to be impacted by single industrial sources. The concentrations typically measured at NATTS sites can thus provide a comparison point useful to considering whether concentrations measured at a school are likely to have been influenced by a significant nearby industrial source, or are more likely to be attributable to emissions from many small sources or to transported pollution from another area. For example, concentrations at a school above the 75th percentile may suggest that a nearby industrial source is affecting air quality at the school.

[b] In calculations involving non-detects (ND), a value of zero is used.

Appendix C. Analysis of Other (non-key) Air Toxics Monitored at the School and Multiple-pollutant Considerations.

At each school, monitoring has been targeted to get information on a limited set of key hazardous air pollutants (HAPs).[16] These pollutants are the primary focus of the monitoring activities at a school and a priority for us based on our emissions, modeling and other information. In analyzing air samples for these key pollutants, we have also obtained results for some other pollutants that are routinely included with the same test method. Our consideration of the data collected for these additional HAPs is described in the first section below. In addition to evaluating monitoring results for individual pollutants, we also considered the potential for cumulative impacts from multiple pollutants as described in the second section below (See Table C-1).

Other Air Toxics (HAPs):

- Do the monitoring data indicate elevated levels of any other air toxics or hazardous air pollutant (HAPs) that pose significant long-term health concerns?

  → Longer-term concentration estimates for the other HAPs monitored are below their long-term comparison levels.

  → Further, for pollutants with cancer-based comparison levels, the longer-term concentration estimates for all but three of these (benzene, carbon tetrachloride, and 1,3-butadiene) are more than 100-fold lower than their long-term comparison levels.[17]

  → Additionally, each individual measurement for these pollutants is below the individual sample (short-term) screening level developed for considering potential short-term exposures for that pollutant.[18]

Additional Information on Three HAPs:

- The first HAP mentioned above is benzene. The mean and 95 percent upper bound on the mean for benzene are approximately 6-7% of the cancer-based comparison level. A review of information available at other sites nationally shows that the mean concentration of benzene at this site is between the 25th and 50th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the National Air Toxics Trends Stations (NATTS) sites (Appendix B).[19]

[16] Section 112(b) of the Clean Air Act identifies 189 hazardous air pollutants, three of which have subsequently been removed from this list. These pollutants are the focus of regulatory actions involving stationary sources described by CAA section 112 and are distinguished from the six pollutants for which criteria and national ambient air quality standards (NAAQS) are developed as described in section 108. One of the criteria pollutants, lead, is also represented as lead compounds on the HAP list.

[17] For benzene, carbon tetrachloride, and 1,3-butadiene, longer-term estimates are below continuous (24 hours a day, 7 days a week) lifetime exposure concentrations associated with 10^{-5} excess cancer risk. For all other pollutants, longer-term estimates are below continuous lifetime exposure concentrations associated with 10^{-6} excess cancer risk.

[18] The individual sample screening levels and their use is summarized on the website and described in detail in *Schools Air Toxics Monitoring Activity (2009), Uses of Health Effects Information in Evaluating Sample Results.*

[19] The NATTS locations are generally sited so as not to be influenced by specific nearby sources, and provide concentration data to which concentrations at the school location can be compared.

- The second HAP mentioned above is carbon tetrachloride. The mean and 95 percent upper bound on the mean for carbon tetrachloride are approximately 4-5% of the cancer-based comparison level. A review of information available at other sites nationally shows that the mean concentration of carbon tetrachloride at this site is between the 75th and 95th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B). Carbon tetrachloride is found globally as a result of its significant past uses in refrigerants and propellants for aerosol cans and its chemical persistence. Virtually all uses have been discontinued. However, it is still measured throughout the world as a result of its slow rate of degradation in the environment and global distribution in the atmosphere.

- The third HAP mentioned above is 1,3-butadiene. The mean and 95 percent upper bound on the mean for 1,3-butadiene are approximately 1% of the cancer-based comparison level. A review of information available at other sites nationally shows that the mean concentration of 1,3-butadiene at this site is below the 50th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

Multiple Pollutants:

As described in the main body of the report and background materials, this initiative and the associated analyses are focused on investigation of key pollutants for each school that were identified by previous analyses. This focused design does not provide for the consideration of combined impacts of pollutants or stressors other than those monitored in this project. Broader analyses and those involving other pollutants may be the focus of other EPA activities.[20]

In our consideration of the potential for impacts from key pollutants at the monitored schools, we have also considered the potential for other monitored pollutants to be present at levels that in combination with the key pollutant levels contribute to an increased potential for cumulative impacts. This was done in cases where estimates of longer-term concentrations for any non-key HAPs are within an order of magnitude of their comparison levels even if these pollutant levels fall below the comparison levels. This analysis is summarized below.

- Do the data collected for the air toxics monitored indicate the potential for other monitored pollutants to be present at levels that in combination with the key pollutant levels indicate an increased potential for cumulative impacts of significant concern (e.g., that might warrant further investigation)?

  → This question can not be answered for acrolein. The data collected for air toxics other than acrolein and their associated longer-term concentration estimates do not together pose significant concerns for cumulative health concerns for cumulative health risk for these pollutants.

    - Longer-term concentration estimates for all non-key HAPs (or air toxics) are more than an order of magnitude lower than their comparison levels.

[20] General information on additional air pollutants is available at http://www.epa.gov/air/airpollutants.html.

Table C-1. Temple Elementary School - Other Monitored Pollutant Analysis.

Parameter	Units	Mean of Measurements[a]	95% Confidence Interval on the Mean	Long-term Comparison Level[b]	
				Cancer-Based[c]	Noncancer-Based[d]
Non-Key HAPs with mean lower than 10% of the lowest comparison level					
Benzene	µg/m^3	0.76	0.58 - 0.93	13	30
Carbon tetrachloride	µg/m^3	0.75	0.69 - 0.81	17	100
Chloromethane	µg/m^3	1.21	1.11 - 1.31	NA	90
Ethylbenzene	µg/m^3	0.13	0.08 - 0.19	40	1000
Acetonitrile	µg/m^3	0.16	0.13 - 0.19	NA	60
Xylene, *m/p-*	µg/m^3	0.26	0.11 - 0.42	NA	100
Dichloromethane	µg/m^3	0.26	0.24 - 0.29	210	1000
Xylene, *o-*	µg/m^3	0.12	0.06 - 0.18	NA	100
Chloroform	µg/m^3	0.08	0.06 - 0.11	NA	98
Toluene	µg/m^3	0.63	0.42 - 0.83	NA	5000
Methyl isobutyl ketone	µg/m^3	0.23	0.12 - 0.33	NA	3000
Carbon disulfide	µg/m^3	0.04	0.02 - 0.05	NA	700
Methyl chloroform	µg/m^3	0.07	0.04 - 0.11	NA	5000
Butadiene, 1,3-	µg/m^3	0.03 [e]	0.01 - 0.05 [e]	3.3	2
Bromomethane	µg/m^3	0.032 [f]	0.02 - 0.05 [f]	NA	5
Tetrachloroethylene	µg/m^3	0.05 [g]	0.01 - 0.09 [g]	17	270
Styrene	µg/m^3	0.05 [h]	0.03 - 0.08 [h]	NA	1000
Non-Key HAPs with more than 50% ND Results.					
Ethylene dichloride	µg/m^3	67% of the results were ND[i]		3.8	2400
Dichlorobenzene, *p-*	µg/m^3	75% of the results were ND[j]		9.1	800
Hexachlorobutadiene	µg/m^3	92% of the results were ND[k]		4.5	90
Vinyl chloride	µg/m^3	92% of the results were ND[l]		11	100
Methyl *tert* -Butyl Ether	µg/m^3	92% of the results were ND[m]		380	3000
Chloroethane	µg/m^3	67% of the results were ND[n]		NA	10000
No other HAPs were detected in any other samples.					

µg/m^3 micrograms per cubic meter

NA Not applicable

ND No results of this chemical were registered by the laboratory analytical equipment.

[a] Mean of measurements is the average of all sample results which include actual measurements. If no chemical was registered, then a value of zero is used when calculating the mean.

[b] Details regarding these values are in the technical report, Schools Air Toxics Monitoring Activity (2009) Uses of Health Effects Information in Evaluating Sample Results.

[c] Air toxics for which the upper 95% confidence limit on the mean concentration is above this cancer-based level will be fully discussed in the text and may be considered a priority for potential follow-up activities, if indicated in light of the full set of information available for the site. Findings of the upper 95% confidence limit below 1% of the comparison level (i.e., where the upper 95% confidence limit is below the corresponding 1-in-1-million cancer risk based concentration) are generally considered a low priority for follow-up activity. Situations where the summary statistics for a pollutant are below this comparison level but above 1% of this level are fully discussed in the text of the report.

[d] Air toxics for which the upper 95% confidence limit on the mean concentration are near or below the noncancer-based comparison level are generally of low concern and will generally be considered a low priority for follow-up activity. Pollutants for which the 95% confidence limits extend appreciably above the noncancer-based comparison level are fully discussed in the school-specific report and may be considered a priority for follow-up activity, if indicated in light of the full set of information available for the site.

[e] 1,3-Butadiene was detected in 8 of 12 samples, ranging from 0.022 to 0.089 µg/m^3. The MDL range is 0.024 to 0.060 µg/m^3.

[f] Bromomethane was detected in 8 of 12 samples, ranging from 0.03 to 0.078 µg/m^3. The MDL range is 0.024 to 0.060 µg/m^3.

[g] Tetrachloroethylene was detected in 6 of 12 samples, ranging from 0.05 to 0.20 µg/m^3. The MDL range is 0.024 to 0.060 µg/m^3.

Table C-1. Temple Elementary School - Other Monitored Pollutant Analysis.

[h] Styrene was detected in 8 of 12 samples, ranging from 0.043 to 0.13 µg/m^3. The MDL range is 0.024 to 0.060 µg/m^3.

[i] Ethylene dichloride was detected in only 4 of 12 samples, ranging from 0.069 to 0.2 µg/m^3. The MDL range is 0.008 to 0.061 µg/m^3.

[j] Dichlorobenzene, *p*- was detected in only 3 of 12 samples, ranging from 0.02 to 0.06 µg/m^3. The MDL range is 0.024 to 0.060 µg/m^3.

[k] Hexachlorobutadiene was detected in only 1 of 12 samples, with a value of 0.03 µg/m^3. The MDL is 0.128 µg/m^3.

[l] Methyl *tert*-butyl ether was detected in only 1 of 12 samples, with a value of 0.03 µg/m^3. The MDL range is 0.032 to 0.050 µg/m^3.

[m] Vinyl chloride was detected in only 1 of 12 samples, with a value of 0.02 µg/m^3. The MDL range is 0.005 to 0.033 µg/m^3.

[n] Chloroethane was detected in only 4 of 12 samples, ranging from 0.02 to 0.04 µg/m^3. The MDL range is 0.005 to 0.032 µg/m^3.

Appendix D. Temple Elementary School Pollutant Concentrations.

Parameter	Units	10/28/2009	12/2/2009	12/8/2009	1/7/2010	1/14/2010	1/25/2010	2/1/2010	2/11/2010	2/16/2010	2/22/2010	3/1/2010	3/8/2010	Sample Screening Level[a]
Benzene	µg/m^3	0.71	0.387	0.719	0.479	1.12	1.05	1.34	0.671	0.639	0.726	0.611	0.607	30
Carbon tetrachloride	µg/m^3	0.699	0.692	0.762	0.692	0.881	0.629	0.881	0.629	0.755	0.718	0.862	0.806	200
Chloromethane	µg/m^3	1.5	1.02	1.19	1.07	1.14	1.22	1.53	1.12	1.24	1.08	1.23	1.19	1,000
Ethylbenzene	µg/m^3	0.087	0.091	0.087	ND	0.17	0.35	0.22	0.087	0.17	0.1	0.091	0.15	40,000
Acetonitrile	µg/m^3	0.208	0.13	0.11	0.168	0.218	0.202	0.202	0.1	0.12	0.15	0.13	0.188	600
Xylene, *m/p-*	µg/m^3	0.143	0.161	0.139	ND	0.304	0.955	0.434	0.174	0.304	0.161	0.130	0.239	3,000
Dichloromethane	µg/m^3	0.22	0.22	0.26	0.348	0.31	0.31	0.24	0.21	0.28	0.24	0.25	0.26	2,000
Xylene, *o-*	µg/m^3	0.074	0.07	0.065	ND	0.13	0.39	0.17	0.087	0.17	0.074	0.065	0.12	9,000
Chloroform	µg/m^3	0.1	0.093	0.11	ND	0.15	0.098	0.098	0.098	0.098	ND	0.068	0.098	500
Toluene	µg/m^3	0.385	0.28	0.641	0.30	0.792	1.36	1.02	0.566	0.566	0.452	0.32	0.852	4,000
Methyl isobutyl ketone	µg/m^3	0.32	ND	0.434	ND	0.33	0.25	0.25	0.12	0.16	0.16	0.14	0.57	30,000
Carbon disulfide	µg/m^3	0.053	0.044	0.065	0.031	ND	ND	0.031	0.031	0.093	0.034	0.02	0.02	7,000
Methyl chloroform	µg/m^3	0.19	0.076	0.093	ND	0.16	ND	0.055	0.055	0.055	0.055	0.06	0.082	10,000
Butadiene, 1,3-	µg/m^3	0.062	ND	0.024	ND	ND	0.089	0.044	0.022	0.044	0.027	ND	0.03	20
Bromomethane	µg/m^3	0.047	0.043	0.054	ND	ND	ND	ND	0.078	0.039	0.03	0.043	0.043	200
Tetrachloroethylene	µg/m^3	0.05	ND	0.095	ND	ND	0.20	ND	0.068	0.14	ND	ND	0.05	1,400
Styrene	µg/m^3	0.081	ND	ND	ND	ND	0.13	0.085	0.043	0.085	0.068	0.068	0.09	9,000
Ethylene dichloride	µg/m^3	ND	ND	ND	ND	0.2	ND	ND	ND	0.081	0.073	0.069	ND	270
Dichlorobenzene, *p-*	µg/m^3	0.02	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND	0.03	10,000
Hexachlorobutadiene	µg/m^3	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	320
Vinyl chloride	µg/m^3	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,000
Methyl *tert*-butyl ether	µg/m^3	ND	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7,000
Chloroethane	µg/m^3	0.02	0.04	0.037	ND	ND	ND	ND	0.026	ND	ND	ND	ND	40,000
Acrylonitrile	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200
Benzyl chloride	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140
Bromoform	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6,400
Chlorobenzene	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10,000
Chloroprene	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	70

Appendix D. Temple Elementary School Pollutant Concentrations.

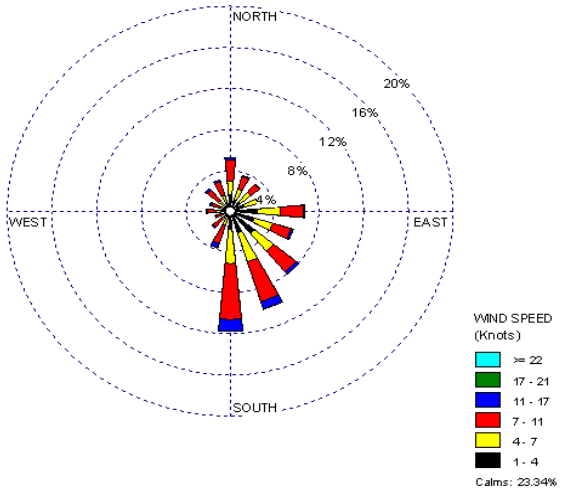
Parameter	Units	10/28/2009	12/2/2009	12/8/2009	1/7/2010	1/14/2010	1/25/2010	2/1/2010	2/11/2010	2/16/2010	2/22/2010	3/1/2010	3/8/2010	Sample Screening Level[a]
Dichloroethane, 1,1-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,400
Dichloroethylene, 1,1-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	80
Dichloropropane, 1,2-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	200
Dichloropropylene, cis-1,3-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14
Dichloropropylene, trans-1,3-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14
Ethyl acrylate	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	20,000
Ethylene dibromide	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12
Methyl methacrylate	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7,000
Tetrachloroethane, 1,1,2,2-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	120
Trichlorobenzene, 1,2,4-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,000
Trichloroethane, 1,1,2-	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	440
Trichloroethylene	µg/m^3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10,000

µg/m^3 micrograms per cubic meter

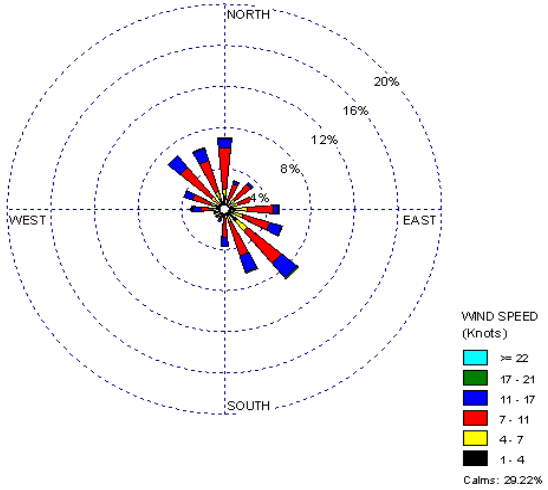
ND No results of this chemical were registered by the laboratory analytical equipment.

[a] The individual sample screening levels and their use is summarized on the web site and described in detail in Schools Air Toxics Monitoring Activity (2009), "Uses of Health Effects Information in Evaluating Sample Results", see http://www.epa.gov/schoolair/pdfs/UsesOfHealthEffectsInfoinEvalSampleResults.pdf. These screening levels are based on consideration of exposure all day, every day over a period ranging up to at least a couple of weeks, and longer for some pollutants.

Appendix E. Windroses for Angelina County Airport NWS Station.



Angelina County Airport
NWS Station
Composite Hourly Windrose,
2002-2007[1]



Angelina County Airport
NWS Station
Across Sampling Period
(Aug. 18, 2009-Mar. 11, 2010)[1]

[1] Angelina County Airport NWS Station (WBAN 93983) is 4.37 miles from Temple Elementary School.