SAT Initiative: Clairton Educational Center (Clairton, Pennsylvania) and South Allegheny Middle School/High School (McKeesport, Pennsylvania)

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 these schools in clear, but generally technical, terms. A summary of this analysis is presented on the page focused on these schools on EPA's website (www.epa.gov/schoolair).

I. Executive Summary

- Air monitoring has been conducted at Clairton Educational Center (Clairton) and South Allegheny Middle School/High School (S. Allegheny) 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.
- These schools were selected for monitoring in consultation with the local air agency, the Allegheny County Health Department (ACHD), based on information indicating the potential for elevated ambient concentrations of pollutants associated with coke oven operations, including benzene, arsenic, and benzo(a)pyrene, in air outside the schoo1. That information included EPA's completed 2002 National-Scale Air Toxics Assessment (NATA) from two sources: a nearby coke oven and a coke by-product facility, which converts the coke oven tars to other products.
- Air monitoring was performed at Clairton from September 4, 2009 to December 21, 2009 for benzene and other volatile organic compounds (VOCs); arsenic and other metals in particulate matter less than 10 microns (PM_{10}); and benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAH). Air monitoring was performed at S. Allegheny from August 5, 2009 to November 30, 2009 for benzene and other VOCs; arsenic and other PM_{10} metals; and benzo(a)pyrene and other PAHs.
- Levels of pollutants associated with coke oven emissions, including benzene, arsenic and benzo(a)pyrene, at both schools indicate the influence of nearby sources. At S. Allegheny, levels of these pollutants are elevated as high as indicated by the modeling information available prior to sampling and indicate the potential for levels of concern for long-term continuous exposure, particularly in areas of this community. At Clairton, levels of these pollutants are below the levels of significant concern that was indicated by the previously available modeling.
- Based on the analysis described here, EPA will extend air toxics monitoring at S. Allegheny to better characterize exposure to the community from the coke oven and the coke by-product facilities.
- EPA remains concerned about emissions from sources of air toxics and continues to work to reduce these emissions across the country, through national rules and by providing information and suggestions to assist with reductions in local areas (http://www.epa.gov/ttn/atw/eparules.html).

- The area surrounding both of these schools (the Liberty-Clairton area of Allegheny County) is currently not meeting national ambient air quality standards (NAAQS) for fine particles (particulate matter less than 2.5 microns in size) which can contain some of the pollutants monitored. The ACHD has submitted a state implementation plan which details how the area will be brought back into attainment with the NAAQS.
- The Allegheny County Health Department (ACHD) will continue to oversee industrial facilities in the area through air permits and other programs. ACHD has also been collecting monitoring data for a variety of pollutants at both schools since 1992.

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 monitored 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 included 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 were placed at each school for approximately 60 days, and took air samples on at least 10 different days during that time. The samples were 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,

[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.

- 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.

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 these Schools and the Air Monitoring Conducted

This document describes air monitoring data collected at Clairton and S. Allegheny. These schools were selected for monitoring in consultation with the local air agency, the Allegheny County Health Department (ACHD). EPA's 2002 NATA analysis also indicated the potential for levels of concern at Clairton due to estimates of pollutants associated with coke oven operations, including benzene, arsenic, and benzo(a)pyrene, in the 2002 National Emissions Inventory for a nearby coke oven (Figure 1). The two sources of interest are located next to each other, a nearby coke oven and a coke by-product facility. Additionally, ACHD has been conducting long-term air monitoring for volatile organic compounds (VOCs) including benzene, particulate matter in two forms (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and hydrogen sulfide (H_2S) at S. Allegheny for several years.

Monitoring was initiated at Clairton on September 4, 2009 and continued through December 21, 2009. During this period 10 samples were collected for PM_{10}[4] and analyzed for arsenic and a small standardized set of additional metals; 13 polycyclic aromatic hydrocarbons (PAHs) samples were analyzed for benzo(a)pyrene and a small standardized set of additional PAHs. Finally, 10 samples of VOC were collected at Clairton and analyzed for benzene and a small standardized set of additional VOCs. Due to an issue with VOC monitoring equipment, seven

[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 general, this sampler collects airborne particles with a diameter of 10 microns or smaller, more of which would be considered to be in the respirable range which is what the health-based comparison level for arsenic is based on.

initial VOC results from Clairton 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 to ensure that 10 valid samples were available for analysis.

Monitoring was initiated at S. Allegheny from August 5, 2009 through November 30, 2009, collecting: 16 PM_{10} samples which were analyzed for arsenic and a small standardized set of additional metals; 21 PAH samples were collected and analyzed for benzo(a)pyrene and a small standardized set of additional PAHs; and 12 VOC samples were analyzed for benzene and a small standardized set of additional VOCs.

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 (SAT) (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).[5]

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) hazardous air pollutants (HAPs or air toxics)[6] 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.

[5] EPA contractors operated the monitors and sent the canisters and filters to the analytical laboratory under contract to EPA.

[6] 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.

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[7] 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 these schools, using routine statistical tools, to derive a 95 percent confidence interval[8] 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 any values below method detection limit (MDL).[9] 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.[10] 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

[7] 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.

[8] 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.

[9] 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.

[10] 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).

→ 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 datasets 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 these 2-3 month monitoring datasets 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 these schools 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.

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 these schools, 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.[11] 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.

[11] The development of long-term comparison levels, as well as of individual sample screening levels, is described in detail in *Schools Air Toxics Monitoring Activity (2009), Uses of Health Effects Information in Evaluating Sample Results.*

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.

Using the analysis approach described above, we analyzed the chemical concentration data (Table 1 and Figures 2a-2c) with regard to areas of interest identified below.

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

- The air sampling data collected at both schools over the five-month sampling period indicate influence from nearby sources of benzene, arsenic and benzo(a)pyrene.
- At South Allegheny, these data and related longer-term concentration estimates for the monitored pollutants commonly associated with coke oven emissions, including benzene, arsenic and benzo(a)pyrene, indicate the potential for levels of concern for long-term continuous exposure to the mixture of pollutants in areas of this community.
- At Clairton, these data and related longer-term concentration estimates are below the levels of significant concern that had been suggested by the modeling information available prior to monitoring.

Benzene, Arsenic and Benzo(a)pyrene, key pollutants:

- Do the monitoring data indicate influence from a nearby source?

  → The monitoring data at both schools include several benzene,[12] arsenic (PM_{10}),[13] and benzo(a)pyrene[14] concentrations that are higher than concentrations commonly observed in other locations nationally.

- Do the monitoring data indicate elevated levels that pose significant long-term health concerns at either school?

[12] For example, six of the concentrations at Clairton and six of the concentrations at S. Allegheny (Table 2a) were higher than 75 percent of samples collected at the National Air Toxics Trends Stations (NATTS) from 2004-2008 (Appendix B). Because these NATTS sites are generally sited so as to not be influenced by specific nearby sources, EPA is using the 75th percentile point of concentrations at these sites as a benchmark of indicating potential influence from a source nearby to the school.

[13] For example, seven of the concentrations at Clairton and eleven of the concentrations at S. Allegheny (Table 2b) were higher than 75 percent of samples collected at the National Air Toxics Trends Stations (NATTS) from 2004-2008 (Appendix B). Because these NATTS sites are generally sited so as to not be influenced by specific nearby sources, EPA is using the 75th percentile point of concentrations at these sites as a benchmark of indicating potential influence from a source nearby to the school.

[14] For example, ten of the concentrations at Clairton and eighteen of the concentrations at S. Allegheny (Table 2b) were higher than 75 percent of samples collected at the National Air Toxics Trends Stations (NATTS) from 2004-2008 (Appendix B). Because these NATTS sites are generally sited so as to not be influenced by specific nearby sources, EPA is using the 75th percentile point of concentrations at these sites as a benchmark of indicating potential influence from a source nearby to the school.

→ At South Allegheny Middle and High School, although the concentrations of arsenic and benzo(a)pyrene are individually below their long-term comparison levels (as described below), benzene concentrations are above their long-term comparison levels, indicating a potential for levels of concern. The concentrations of these and some other pollutants associated with coke oven emissions contribute to the potential for levels of concern for long-term continuous exposure to the mixture of pollutants (see Appendix C). The levels of the monitored pollutants at Clairton Educational Center, while indicating an influence of the coke-related sources, are below the levels of significant concern that had been suggested by the modeling information available prior to sampling.

- The estimate of longer-term benzene concentration (i.e., the upper bound of the 95 percent confidence interval on the mean of the dataset) for S. Allegheny is above the cancer-based long-term comparison level (Table 1)[15], while the estimate of longer-term benzene concentration for Clairton is below this comparison level (Table 1).[16] This comparison level is based on consideration of continuous exposure concentrations (24 hours a day, all year, over a lifetime).
  - The finding of the longer-term concentration estimate for benzene at S. Allegheny to be greater than the cancer-based comparison level indicates that the longer-term estimate at this location is greater than a continuous (24 hours a day, 7 days a week) lifetime exposure concentration associated with a 1-in-10,000 additional cancer risk. The longer-term concentration estimate for benzene at Clairton is somewhat less than one half the cancer-based comparison level, indicating that the longer-term estimate at this location falls between continuous (24 hours a day, 7 days a week) lifetime exposure concentrations associated with 1-in-100,000 and 1-in-10,000 additional cancer risk.
  - Additionally, one sample result for benzene at S. Allegheny was higher than the individual sample screening level.[11] An individual sample above the screening level is a signal to EPA to evaluate that result as well as immediately prior and subsequent results. Consideration of all of these results did not identify concerns regarding short-term exposure. Results for Clairton also did not identify concerns regarding short-term exposures as each individual measurement at that school is below the individual sample screening level (which is based on consideration of exposure all day, every day over a period ranging from a couple of weeks to longer for some pollutants).[11]
- The estimates of longer-term arsenic (PM_{10}) concentrations (i.e., the upper bound of the 95 percent confidence interval on the mean of the dataset) at both Clairton and S. Allegheny are below the long-term comparison levels (Table

[15] The upper end of the interval at South Allegheny Middle School/ High School is 1.8 times the mean of the monitoring data and 1.6 times the long-term cancer-based comparison level.
[16] The upper end of the interval at Clairton is 2.2 times the mean of the monitoring data and less than 36% of the long-term cancer-based comparison level.

1).[17] These comparison levels are based on consideration of continuous exposure concentrations (24 hours a day, all year, over a lifetime).

- The longer-term concentration estimate for S. Allegheny is somewhat below one half of the cancer-based comparison level, indicating the longer-term estimate falls between continuous (24 hours a day, 7 days a week) lifetime exposure concentrations associated with 1-in-100,000 and 1-in-10,000 additional cancer risk. The longer-term concentration estimate for Clairton is more than tenfold lower than the cancer-based comparison level, indicating the longer-term estimate is below a continuous (24 hours a day, 7 days a week) lifetime exposure concentration associated with 1-in-100,000 additional cancer risk.
- We did not identify concerns regarding short-term exposures at either school as each individual measurement is below the individual sample screening level for arsenic (which is based on consideration of exposure all day, every day over a period ranging from a couple of weeks to longer for some pollutants).[11]

- The estimates of longer-term benzo(a)pyrene concentration (i.e., the upper bound of the 95 percent confidence interval on the mean of the dataset) for each school is below the long-term comparison level (Table 1).[18] This comparison level is based on consideration of continuous exposure concentrations (24 hours a day, all year, over a lifetime).
  - The longer-term concentration estimate for S. Allegheny is just less than half of the cancer-based comparison level, indicating the longer-term estimate falls between continuous (24 hours a day, 7 days a week) lifetime exposure concentrations associated with 1-in-100,000 and 1-in-10,000 additional cancer risk. The longer-term concentration estimate for Clairton is more than tenfold lower than the cancer-based comparison level, indicating the longer-term estimate is below a continuous (24 hours a day, 7 days a week) lifetime exposure concentration associated with 1-in-100,000 additional cancer risk.
  - Additionally, we did not identify concerns regarding short-term exposures at either school, as each individual measurement is below the individual sample screening level for benzo(a)pyrene (which is based on consideration of exposure all day, every day over a period ranging from a couple of weeks to longer for some pollutants).[11]

[17] The upper end of the interval at Clairton is 1.6 times the mean of the monitoring data and less than 14% of the long-term noncancer-based comparison level. The upper end of the interval at S. Allegheny is 1.7 times the mean of the monitoring data and less than 63% of the long-term noncancer-based comparison level.

[18] The upper end of the interval at Clairton is 1.8 times the mean of the monitoring data and less than 4% of the long-term cancer-based comparison level. The upper end of the interval at S. Allegheny is 1.8 times the mean of the monitoring data and less than 40% of the long-term cancer-based comparison level.

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 for other HAPs monitored at both schools indicate longer-term concentration estimates below their long-term comparison levels (Appendix C). However, the combined presence of the key and other HAPs monitored at S. Allegheny indicate the potential for levels of concern for long-term, continuous exposure to the mixture of pollutants particularly in areas of that community.

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 combined presence of several pollutants associated with coke oven operations (Appendix C) indicate the potential for levels of concern for long-term, continuous exposure to the mixture of pollutants particularly in areas of the S. Allegheny community.[19]

C. Wind and Other Meteorological Data

At each school monitored as part of this initiative, we collected meteorological data, minimally for wind speed and direction, during the sampling period. Additionally, we identified the nearest National Weather Service (NWS) station at which a longer record is available. Although the closest NWS station to these schools is at the Allegheny County Airport (3.4 miles from Clairton and 4.5 miles from S. Allegheny), meteorological information has been collected at S. Allegheny since 2005. Wind speed and wind direction measurements from this school are being used to provide a context of historical wind patterns in this area.

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.

[19] 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.

During the sampling period, the wind anemometer associated with the SAT monitoring program for S. Allegheny was not operating correctly. However, the ACHD has been operating a meteorological station at this same school since 2005. The ACHD wind observations were used as a surrogate for S. Allegheny, as well as historical met data.

The meteorological stations at Clairton and S. Allegheny collected wind speed and wind direction measurements for the following time periods:

- → Clairton: June 23, 2009 continuing through the sampling period (September 4, 2009-December 21, 2009) and ending on March 9, 2010.
- → S. Allegheny: April 1, 2005 continuing through the sampling period (August 5, 2009-November 30, 2009); this meteorological station is currently collecting wind speed and wind direction measurements.

On-site data for these meteorological parameters are available for all dates of sample collection and also for intervening days, producing an approximately 5-month record. The meteorological data collected on sampling days are presented in Tables 2a-2b and Figures 3a-3c, and 4a-4c. Sampling period meteorological data are also presented in Figures 4a-4c and Appendix E. Finally, historical meteorological data at S. Allegheny from 2005-2009 are also presented in Appendix E.

As mentioned above, the nearest meteorological station is located at S. Allegheny in McKeesport, Pennsylvania. This station is located on the S. Allegheny property and 2.28 miles to the north of Clairton. Only temperature and precipitation measurements were retrieved from the Allegheny County Airport NWS station, and this information is presented in Tables 2a-2b.

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

- Both the sampling results 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 locations.

- The wind patterns at the monitoring site at each school across sampling dates for the key pollutants are similar to those observed across the record of on-site meteorological data at each school during the sampling period.

- Wind directions at the two schools appear somewhat similar in that the predominant winds have a westerly component on sampling days. Therefore, they appear to be somewhat affected by the same general meteorological conditions that affect overall wind direction in the study region.

- Our ability to provide a confident characterization of the wind flow patterns at the monitoring site over the long-term is limited. The meteorological site at S. Allegheny, for which a long-term data record is available, does not appear to represent the specific wind flow patterns at the Clairton location probably due to differences created by the Monongahela River and terrain around the river.

- For the meteorological station sited at S. Allegheny, the wind patterns during the sampling period are generally similar to the historical long-term wind flow patterns at that same site. This suggests that, on a regional scale, the 5-month sampling period may be representative of year-round wind patterns.

- What are the directions of the key sources of benzene, arsenic, and benzo(a)pyrene emissions in relation to the school location?

  → The nearby industrial facilities emitting the key pollutants into the air (described in section III above) both lie less than 1 mile north to northeast of the Clairton and less than 2 miles south to south-southwest of the S. Allegheny.

  → Using the property boundaries of the full facilities (in lieu of information regarding the location of specific sources of benzene, arsenic, and benzo(a)pyrene emissions at the facility), we have identified an approximate range of wind directions to use in considering the potential influence of these facilities on air concentrations at each school.

  → This general range of wind directions is referred to here as the expected zone of source influence (ZOI). The expected ZOI for Clairton is from approximately 350-100 degrees. The expected ZOI for S. Allegheny is from approximately 170-235 degrees.

- On days the air samples were collected, how often did wind come from direction of the key source and is there any relationship in wind patterns between the two schools?

→ At Clairton, for benzene, there were 5 out of 10 sampling days in which the on-site wind data for had a portion of the winds from the ZOI (Table 2a and Figure 3a). For arsenic (PM_{10}), there were 7 out of 10 sampling days in which on-site wind data had a portion of the winds from the ZOI (Table 2b and Figure 3b). For benzo(a)pyrene, there were 10 out of 13 sampling days in which on-site wind data had a portion of the winds from the ZOI (Table 2b and Figure 3c).

→ At S. Allegheny, for benzene, there were 10 out of 12 sampling days in which the on-site wind data had a portion of the winds from the ZOI (Table 2a and Figure 3a). For arsenic (PM_{10}), there were 12 out of 16 sampling days in which on-site wind data had a portion of the winds from the ZOI (Table 2b and Figure 3b). For benzo(a)pyrene, there were 17 out of 21 sampling days in which on-site wind data had a portion of the winds from the ZOI (Table 2b and Figure 3c).

→ Wind directions at the two schools appear somewhat similar in that the predominant winds come from the west during sampling days. The most prevalent winds during sampling days at the Clairton appear to come generally from the northwest quadrant. The most prevalent winds during sampling days at the S. Allegheny appear to come generally from the southwest quadrant.

- 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?
  → For each school, wind patterns across the air monitoring days appear similar to those observed over the record of on-site meteorological data during the sampling period.
  → Wind data are available at the S. Allegheny site from 2005-2009. We note that wind patterns at the S. Allegheny during the sampling period are similar those recorded at that same school over the long-term (2005-2009 period; Appendix E), supporting the idea that regional meteorological patterns in the area during the sampling period were consistent with long-term patterns. However, there is some uncertainty as to whether the general wind patterns at the Clairton for longer periods would be similar to the general wind patterns at the S. Allegheny (see below).

- How do wind patterns for each school compare to those at the S. Allegheny meteorological 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 Clairton site and at the reference meteorological station (approximately 5 months), prevalent winds at the Clairton site are predominantly from the northwest quadrant, while those at the meteorological station at S. Allegheny are from the southwest and northeast quadrants. Given the relative location of each school, the windroses for the two sites during the sampling period (Figures 4a-4c and Appendix E) show only mild similarities in wind flow patterns, mainly a westerly component in the wind probably due to differences created by the Monongahela River and terrain around the river.

- Are there other meteorological patterns that may influence the measured concentrations at the school monitoring site?

→ For Clairton and S. Allegheny, we did observe that the highest concentrations of benzene, arsenic (PM_{10}), and benzo(a)pyrene were recorded on days in which the wind was blowing from the expected ZOI.

V. Other Monitoring in This Community

The ACHD has conducted air monitoring at Clairton Educational Center since April 8, 1992 and at South Allegheny High School since October 4, 1969. ACHD is currently monitoring for particulate matter less than 2.5 microns in size ($PM_{2.5}$) and particulate matter less than 10 microns in size (PM_{10}) at Clairton, and for $PM_{2.5}$, PM_{10}, sulfur dioxide (SO_2), hydrogen sulfide (H_2S) and benzene at S. Allegheny. The most recent assessment of the ACHD monitoring network describes the role of nighttime inversions in the elevated levels of particulate matter concentrations documented at S. Allegheny (referred to as the Liberty monitoring site).[20] Both of these schools are within the Liberty-Clairton nonattainment area for the national ambient air quality standard (NAAQS) for $PM_{2.5}$. Among the monitors in this area, levels of $PM_{2.5}$ are routinely greatest at the S. Allegheny site. For the most recent 3-years for which $PM_{2.5}$ data are available (2007-2009), levels exceed the annual standard. Additionally, the 2009 $PM_{2.5}$ levels at the S. Allegheny site also exceed the 24-hour standard.[21]

The ACHD benzene monitoring method at the S. Allegheny site differs from that used in this project, contributing to some differences in the results. The ACHD uses an auto gas chromatograph (Auto GC) which samples and analyzes air over short (e.g., 1 hour) averaging periods with results available in close to real time. This instrumentation is used to screen for select compounds at higher concentrations to evaluate for acute health concerns. The VOC sample method used in the SAT project collects a 24 hour composite sample which is typically used to detect a greater variety of VOCs at lower concentrations to evaluate for chronic health concerns.

A meteorological station is also located with the instruments. More information may be found at their website: http://www.achd.net/air/index.html

VI. Key Source Information

- Was the source operating as usual during the monitoring period?
  - The nearby source coke oven has an operating permit issued by ACHD that includes operating requirements.[22]
  - Information from the nearby coke oven source indicates that this facility was operating at a rate of about 65% of normal capacity during the sampling period. This takes into account the fact that several batteries were permanently shut down in spring 2009.

[20] See page 35 - http://www.achd.net/air/pubs/2010%205-Year%20Network%20Assessment%20Final.pdf
[21] See Allegheny County Health Department 2009 Air Quality Annual Report available at: http://www.achd.net/air/annualreports/2009_final_AQ.pdf.
[22] Operating permits, which are issued to air pollution sources under the Clean Air Act, are described at: http://www.epa.gov/air/oaqps/permits.

- Information from the nearby coke by-product facility indicates that this facility was operating at 32% capacity during the sampling period, down from previous years. In 2010, capacity was up to 67% and closer to operations in years previous to the economic downturn in 2009.
- The most recently available benzene emissions data from Source A (2005 NATA, 2008 TRI) are higher to those relied upon in previous modeling analysis for this area (2002 NATA, 2005 TRI). The most recently available benzene emissions data from Source B (2008 TRI) are lower to those relied upon in previous modeling analysis for this area (2005 TRI). The most recently available emissions data from both sources benzo(a)pyrene (2005 NATA) are similar to those relied upon in previous modeling analysis for this area (2002 NATA). Neither source reported arsenic emissions.

VII. Integrated Summary and Next Steps

A. Summary of Key Findings

1. What are the key HAPs for these schools?
   → Benzene, arsenic, and benzo(a)pyrene are the key HAP(s) for these schools, identified based on coke oven emissions information considered in identifying the schools for monitoring. The ambient air concentrations of benzene, arsenic (PM_{10}), and benzo(a)pyrene on several days during the sampling period indicate contributions from sources in the area.

2. Do the data collected at these schools indicate an elevated level of concern, as implied by information that led to identifying this school for monitoring?
   → The data collected for pollutants associated with coke oven emissions, including benzene, arsenic and benzo(a)pyrene and other monitored pollutants indicate a potential for levels of concern for long-term continuous exposure to this mixture of pollutants in the air, particularly in areas of the S. Allegheny community. At Clairton, levels of these pollutants also indicate the influence of nearby sources, but are below the levels of significant concern for long-term exposure that was indicated by the modeling.
   → EPA remains concerned about emissions from sources of air toxics and continues to work to reduce these emissions across the country, through national rules and by providing information and suggestions to assist with reductions in local areas (http://www.epa.gov/ttn/atw/eparules.html).

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 sampling 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 these sites, we have none that would indicate generally higher (or lower) concentrations during other times of year. The wind flow patterns at the S. Allegheny during the sampling period appear to

be representative of long-term wind flow at that site. Our finding that the wind patterns from the S. Allegheny are only somewhat similar to those at Clairton limits our ability to confidently predict longer-term wind patterns at Clairton probably due to differences created by the Monongahela River and terrain around the river.

B. Next Steps for Key Pollutants

1. Based on the analysis described here, EPA will extend air toxics monitoring at S. Allegheny to better characterize exposure to the community from the coke oven and coke by-product facilities.
2. EPA remains concerned about emissions from sources of air toxics and continues to work to reduce these emissions across the country, through national rules and by providing information and suggestions to assist with reductions in local areas (http://www.epa.gov/ttn/atw/eparules.html).
3. The Allegheny County Health Department (ACHD) will continue to oversee industrial facilities in the area through air permits and other programs. ACHD has also been collecting monitoring data for a variety of pollutants at both schools since 1992.

VII. Figures and Tables

A. Tables

1. Clairton Educational Center and South Allegheny Middle/High School – Key Pollutant Analysis.

2a. Clairton Educational Center and South Allegheny Middle/High School Key Pollutant (Benzene) Concentrations and Meteorological Data.

2b. Clairton Educational Center and South Allegheny Middle/High School Key Pollutant (Arsenic (PM_{10}) and Benzo(a)pyrene) Concentrations and Meteorological Data.

B. Figures

1. Clairton Educational Center, South Allegheny Middle/High School, and the Sources of Interest (A, B).

2a. Clairton Educational Center and South Allegheny Middle/High School – Key Pollutant (Benzene) Analysis.

2b. Clairton Educational Center and South Allegheny Middle/High School – Key Pollutant (Arsenic (PM_{10})) Analysis.

2c. Clairton Educational Center and South Allegheny Middle/High School – Key Pollutant (Benzo(a)pyrene) Analysis.

3a. Clairton Educational Center and South Allegheny Middle/High School – Benzene Concentration and Wind Information.

3b. Clairton Educational Center and South Allegheny Middle/High School – Arsenic (PM_{10}) Concentration and Wind Information.

3c. Clairton Educational Center and South Allegheny Middle/High School – Benzo(a)pyrene Concentration and Wind Information.

4a. Clairton Educational Center and South Allegheny Middle/High School – Wind Information (Benzene).
4b. Clairton Educational Center and South Allegheny Middle/High School – Wind Information (Arsenic (PM_{10})).
4c. Clairton Educational Center and South Allegheny Middle/High School – Wind Information (Benzo(a)pyrene).

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 Schools and Multiple-pollutant Considerations.

D. Clairton Educational Center and South Allegheny Middle/High School - Pollutant Concentrations.

E. Windroses for S. Allegheny Meteorological Station.

Figure 1. Clairton Educational Center, South Allegheny Middle/High School, and the Sources of Interest (A, B).

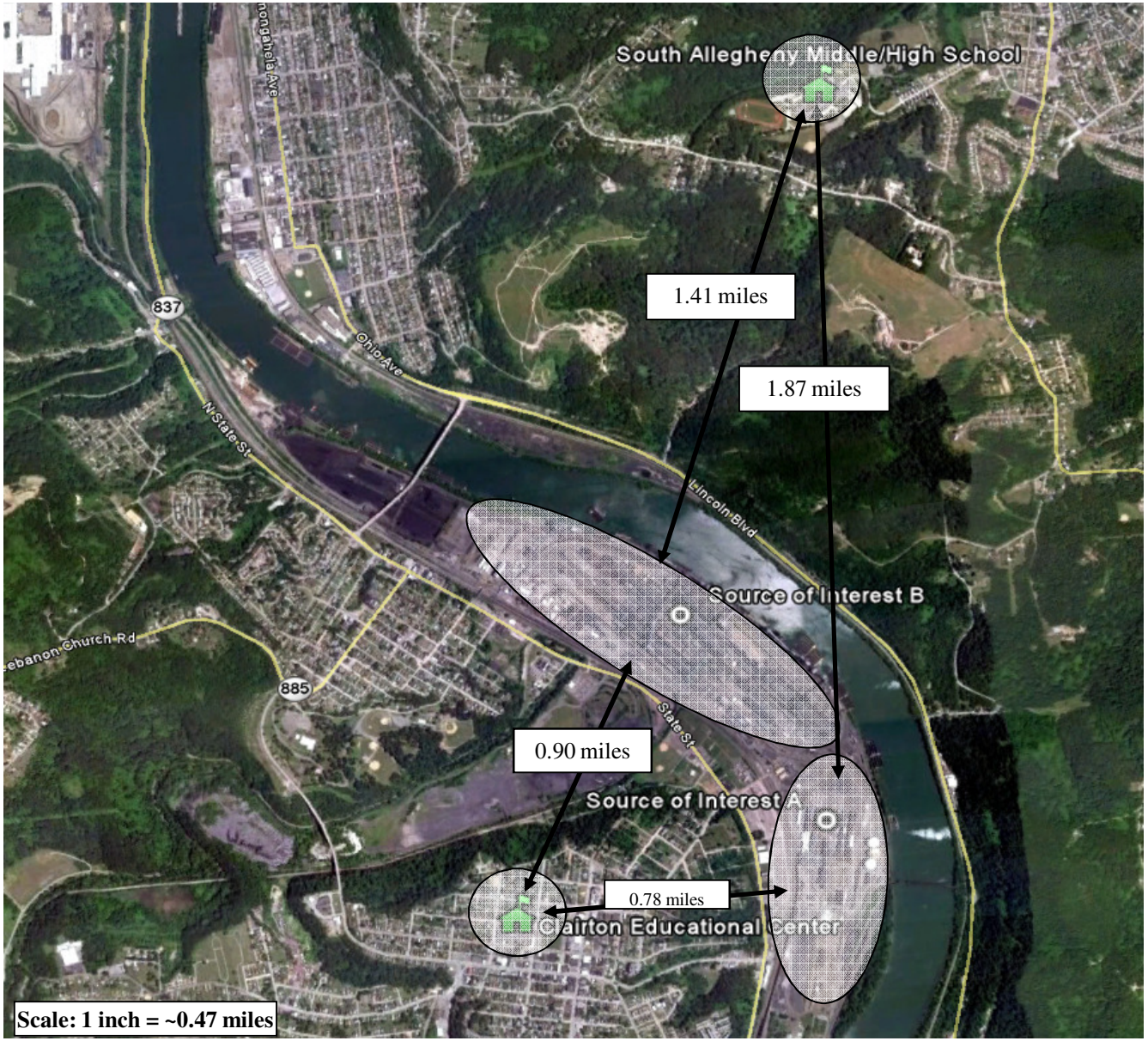


Table 1. Clairton Educational Center and South Allegheny Middle/High School - Key Pollutant Analysis.

Parameter	School Name	Units	Mean of Measurements	95% Confidence Interval on the Mean	Long-term Comparison Level[a]	
					Cancer-Based[b]	Noncancer-Based[c]
Benzene	Clairton Educational Center	$\mu g/m^3$	2.71 [d]	0.70 - 4.72	13	30
	South Allegheny Middle-High		9.40 [e]	0 - 20.4		
Arsenic (PM_{10})	Clairton Educational Center	ng/m^3	1.30 [f]	0.57 - 2.03	23	15
	South Allegheny Middle-High		5.32 [g]	1.34 - 9.31		
Benzo(a)pyrene	Clairton Educational Center	ng/m^3	1.15 [h]	0.27 - 2.02	57	NA
	South Allegheny Middle-High		12.1 [i]	1.95 - 22.3		

ng/m^3 nanograms per cubic meter

$\mu g/m^3$ micrograms per cubic meter

NA Not available

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

[b] Air toxics for which the upper 95% confidence limit on the mean concentration is above this cancer-based comparison 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.

[c] 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.

[d] The mean of measurements for benzene is the average of all sample results, which include ten detections that ranged from 0.31 to 9.43 $\mu g/m^3$.

[e] The mean of measurements for benzene is the average of all sample results, which include twelve detections that ranged from 0.30 to 60.4 $\mu g/m^3$.

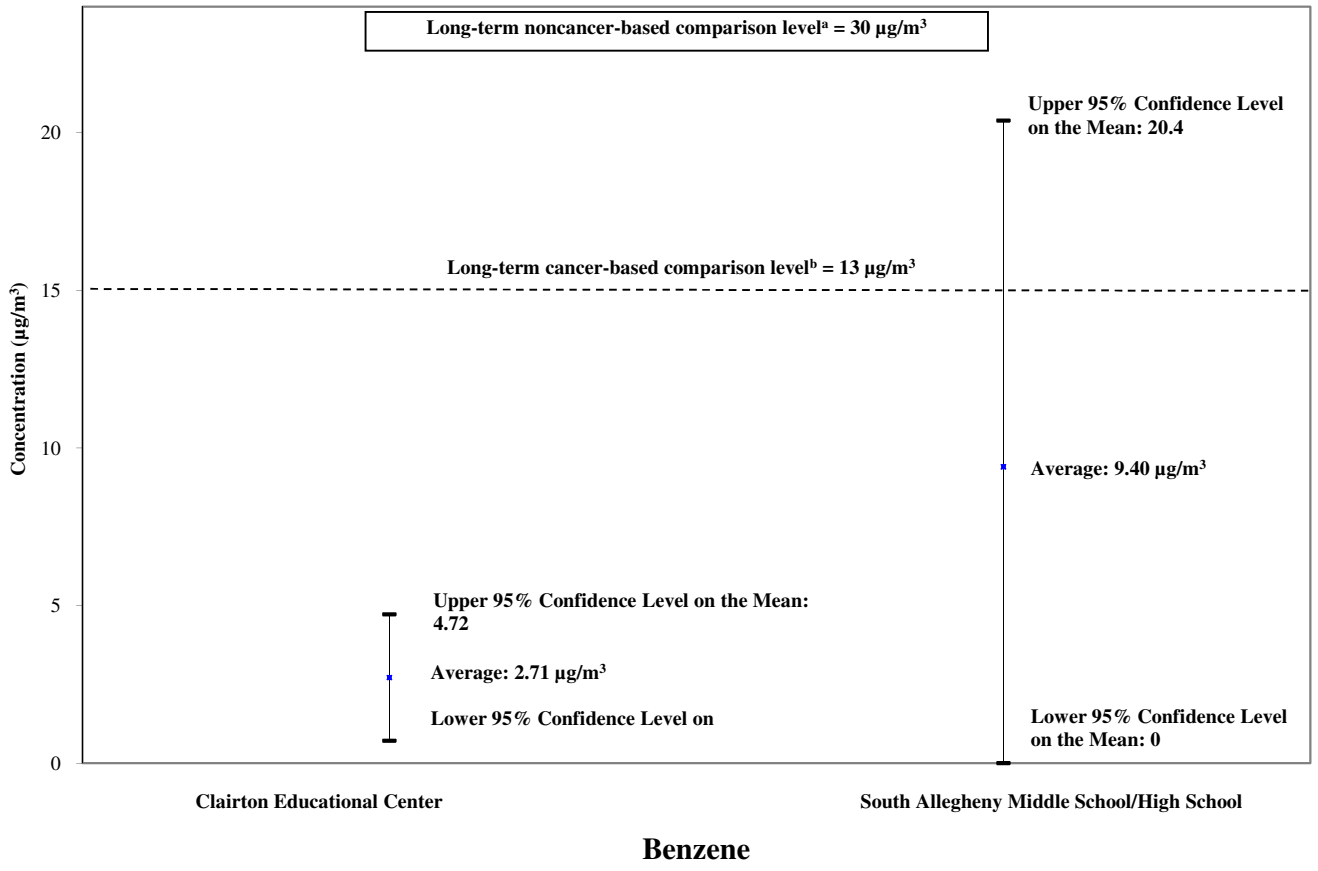
[f] The mean of measurements for arsenic (PM_{10}) is the average of all sample results, which include nine detections that ranged from 0.08 to 3.20 ng/m^3, as well as one sample in which no chemical was registered by the laboratory analytical equipment. For this sample, a value of zero was used in calculating the mean.

[g] The mean of measurements for arsenic (PM_{10}) is the average of all sample results, which include fifteen detections that ranged from 0.37 to 25.1 ng/m^3, as well as one sample in which no chemical was registered by the laboratory analytical equipment. For this sample, a value of zero was used in calculating the mean.

[h] The mean of measurements for benzo(a)pyrene is the average of all sample results, which include twelve detections that ranged from 0.0400 to 4.94 ng/m^3, as well as one sample in which no chemical was registered by the laboratory analytical equipment. For this sample, a value of zero was used in calculating the mean.

[i] The mean of measurements for benzo(a)pyrene is the average of all sample results, which include twenty detections that ranged from 0.0300 to 80.9 ng/m^3, as well as one sample in which no chemical was registered by the laboratory analytical equipment. For this sample, a value of zero was used in calculating the mean.

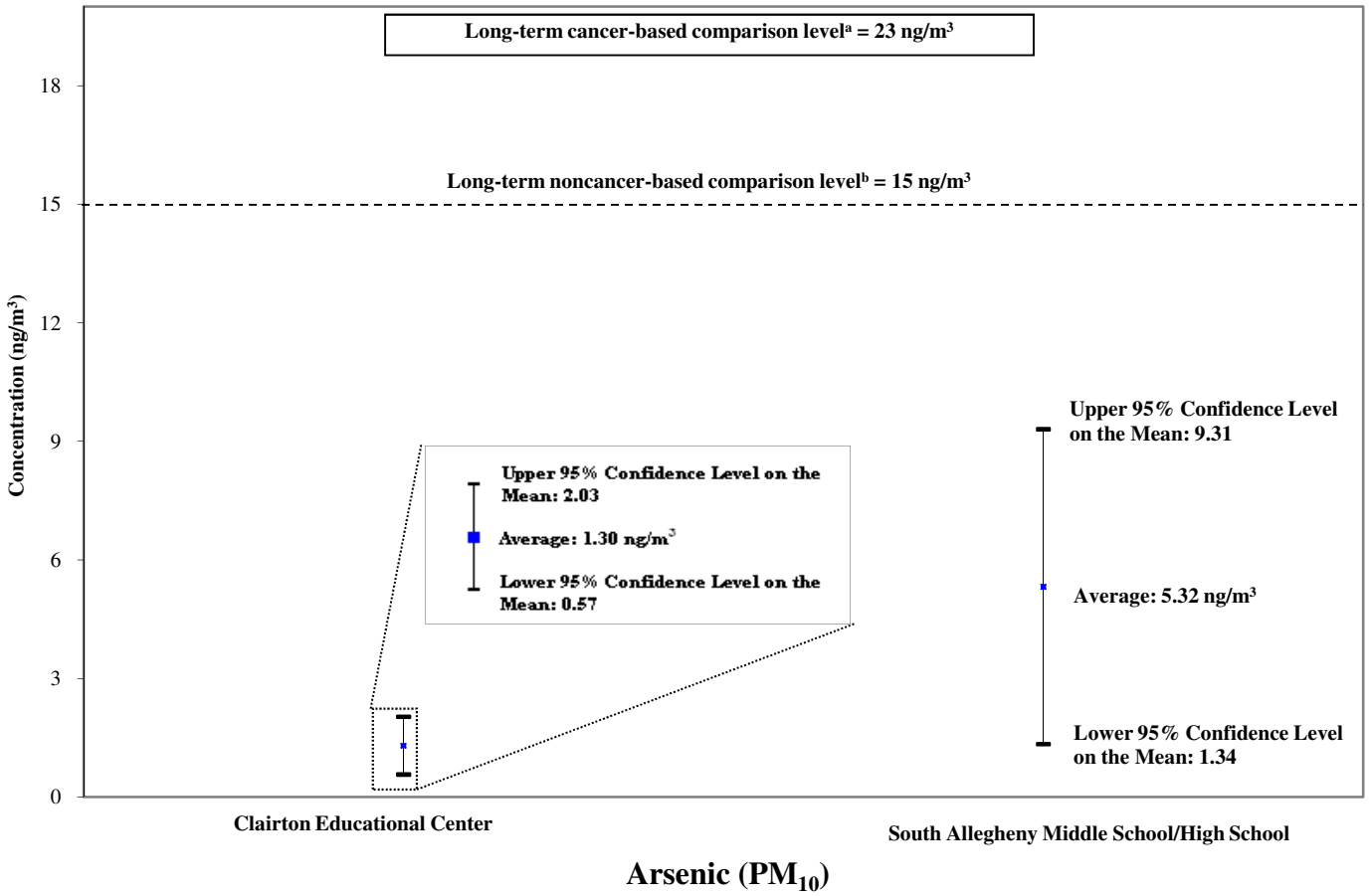
Figure 2a. Clairton Educational Center and South Allegheny Middle/High School - Key Pollutant (Benzene) Analysis.



[a] 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.

[b] Air toxics for which the upper 95% confidence limit on the mean concentration is above this cancer-based comparison 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.

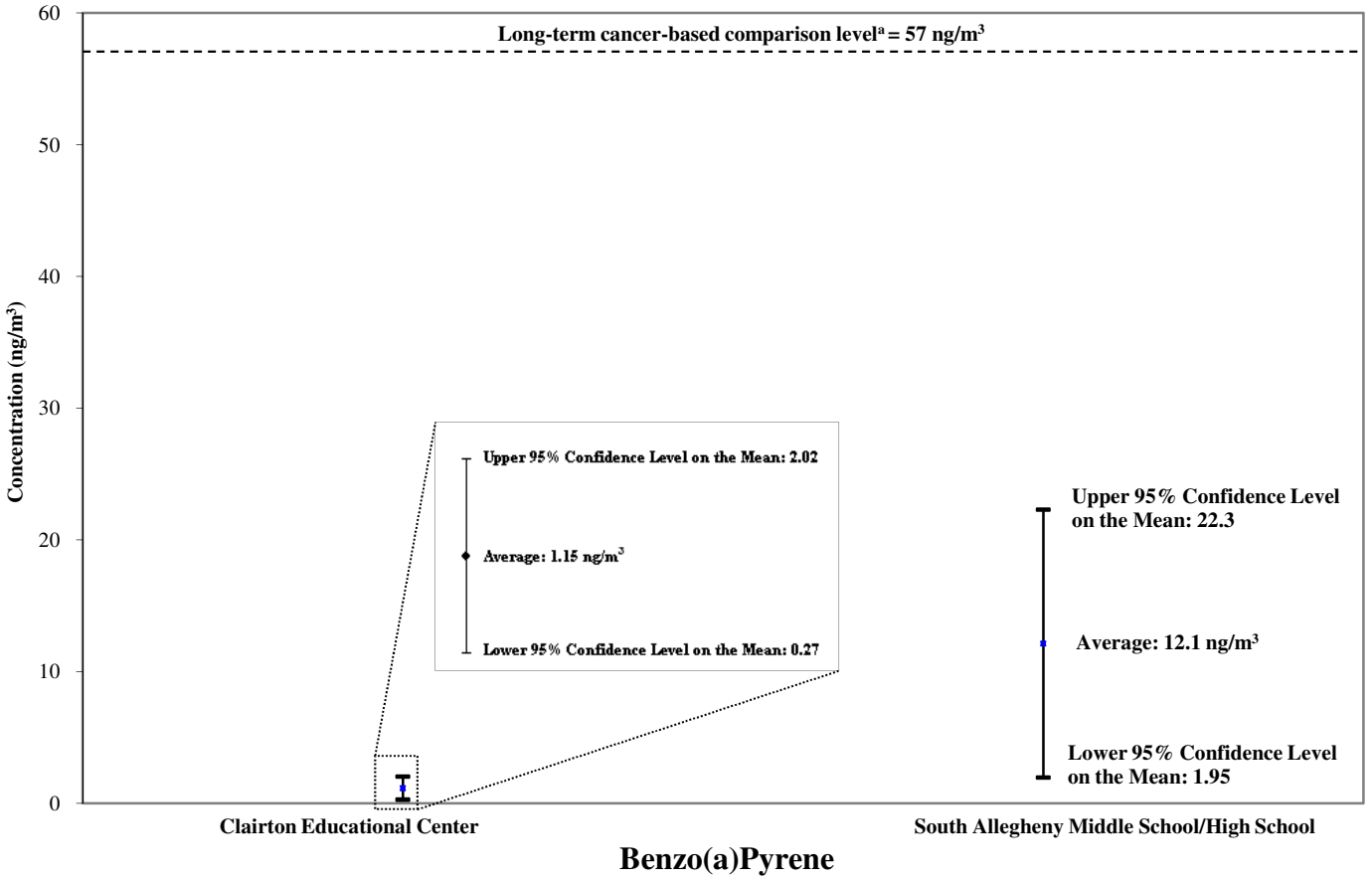
Figure 2b. Clairton Educational Center and South Allegheny Middle/High School - Key Pollutant (Arsenic (PM_{10})) Analysis.



[a] Air toxics for which the upper 95% confidence limit on the mean concentration is above this cancer-based comparison 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.

[b] 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.

Figure 2c. Clairton Educational Center and South Allegheny Middle/High School - Key Pollutant (Benzo(a)Pyrene) Analysis.



[a] Air toxics for which the upper 95% confidence limit on the mean concentration is above this cancer-based comparison 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.

Table 2a. Clairton Educational Center and South Allegheny Middle/High School Key Pollutant (Benzene) Concentrations and Meteorological Data.

Parameter	Units	8/23/2009	9/4/2009	9/10/2009	9/16/2009	9/22/2009	9/28/2009	10/4/2009	10/10/2009	10/16/2009	10/22/2009	10/28/2009	11/3/2009	11/9/2009	11/15/2009	11/21/2009	11/24/2009	11/30/2009	12/10/2009	12/14/2009	12/17/2009	12/21/2009
Clairton Educational Center[a]																						
Benzene	µg/m^3	--	--	--	--	--	--	--	--	--	5.85	0.965	0.962	9.43	2.71	1.92	--	--	0.31	1.44	2.84	0.710
% Hours w/Wind Direction from Expected ZOI[b]	%	--	33.3	37.5	91.7	4.2	0.0	0.0	8.3	16.7	8.3	12.5	0.0	4.2	4.2	45.8	--	--	0.0	0.0	0.0	0.0
Wind Speed (avg. of hourly speeds)	mph	--	1.8	2.5	3.1	1.6	4.3	2.4	3.4	2.1	2.1	2.7	3.6	1.2	1.5	2.2	--	--	8.0	2.8	2.7	4.5
Wind Direction (avg. of unitized vector)[c]	deg.	--	100.8	49.5	162.9	247.1	260.7	318.4	120.9	274.4	274.4	316.6	299.3	286.2	261.0	21.3	--	--	288.4	245.1	272.1	291.0
% of Hours with Speed below 2 knots	%	--	87.5	50.0	33.3	87.5	20.8	54.2	33.3	66.7	66.7	62.5	50.0	95.8	83.3	58.3	--	--	0.0	54.2	25.0	0.0
South Allegheny Middle School/High School[d]																						
Benzene	µg/m^3	0.511	4.73	--	--	--	--	--	5.85	0.30	11.3	0.409	24.0	60.4	2.73	0.585	0.774	1.25	--	--	--	--
% Hours w/Wind Direction from Expected ZOI[b]	%	20.8	8.3	0.0	0.0	20.8	50.0	25.0	16.7	0.0	75.0	16.7	25.0	79.2	58.3	25.0	0.0	20.8	--	--	--	--
Wind Speed (avg. of hourly speeds)	mph	2.6	1.7	4.3	5.9	2.2	10.1	6.0	5.2	3.3	4.4	5.8	6.5	2.4	3.1	3.5	1.7	7.7	--	--	--	--
Wind Direction (avg. of unitized vector)[c]	deg.	310.2	7.7	71.9	38.5	138.9	229.6	240.6	289.6	18.4	219.6	252.5	279.3	194.7	229.9	291.3	68.4	283.0	--	--	--	--
% of Hours with Speed below 2 knots	%	41.7	70.8	29.2	0.0	75.0	0.0	0.0	0.0	16.7	20.8	0.0	4.2	41.7	37.5	12.5	75.0	0.0	--	--	--	--
Allegheny County Airport NWS Station																						
Daily Average Temperature	° F	64.7	67.6	64.5	64.0	68.0	58.9	54.3	52.6	37.5	60.0	53.6	45.8	57.1	56.8	48.3	48.6	39.4	18.1	46.3	27.2	29.0
Daily Precipitation	inches	0.10	0.00	0.01	0.00	0.22	0.11	0.00	0.18	0.22	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.24	0.02	0.02	0.00	0.02

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

[a] Due to timer issues, manual samples taken from 10/28/09 through 11/9/09 and 11/21/09 through 12/21/09 began after 10:30am and extending for 24 hours into the next day. As such, the hourly meteorological measurements correlating to the 24 hour sample were adjusted

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

[c] 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).

[d] Due to timer issues, manual samples taken from 10/28/09 through 11/30/09 began after 9:30am and extending for 24 hours into the next day. As such, the hourly meteorological measurements correlating to the 24 hour sample were adjusted.

-- No sample was conducted for this pollutant on this day or the result was invalidated.

Table 2b. Clairton Educational Center and South Allegheny Middle/High School Key Pollutant (Arsenic (PM_{10}) and Benzo(a)pyrene) Concentrations and Meteorological Data.

Parameter	Units	8/5/2009	8/11/2009	8/17/2009	8/23/2009	8/29/2009	9/4/2009	9/10/2009	9/16/2009	9/22/2009	9/28/2009	10/4/2009	10/10/2009	10/16/2009	10/22/2009	10/28/2009	11/3/2009	11/9/2009	11/15/2009	11/21/2009	11/24/2009	11/30/2009
Clairton Educational Center																						
Arsenic (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	1.21	0.08	2.40	1.18	3.20	0.23	1.62	1.16	ND	--	1.91	--	--
Benzo(a)pyrene	ng/m^3	--	--	--	--	--	4.94	--	2.93	0.100	0.0400	ND	0.0800	1.84	1.09	0.820	0.180	1.96	0.750	0.180	--	--
% Hours w/Wind Direction from Expected ZOI[a]	%	--	--	--	--	--	33.3	37.5	91.7	4.2	0.00	0.00	8.3	16.7	8.3	12.5	0.00	8.3	4.2	12.5	--	--
Wind Speed (avg. of hourly speeds)	mph	--	--	--	--	--	1.8	2.5	3.1	1.6	4.3	2.4	3.4	2.1	2.1	2.8	3.7	1.2	1.5	1.7	--	--
Wind Direction (avg. of unitized vector)[b]	deg.	--	--	--	--	--	338.6	100.8	49.5	162.9	247.1	260.7	318.4	120.9	274.4	279.4	304.4	269.4	261.0	288.8	--	--
% of Hours with Speed below 2 knots	%	--	--	--	--	--	87.5	50.0	33.3	87.5	20.8	54.2	33.3	66.7	66.7	50.0	41.7	95.8	83.3	83.3	--	--
South Allegheny Middle School/High School																						
Arsenic (PM_{10})	ng/m^3	ND	2.58	7.01	1.55	--	8.88	1.08	0.63	--	1.47	--	--	0.37	16.6	0.86	--	25.1	15.8	1.58	1.09	0.55
Benzo(a)pyrene	ng/m^3	0.510	5.72	13.9	0.350	6.49	4.55	ND	0.0300	0.170	2.93	5.33	12.6	0.0300	54.0	0.300	10.5	80.9	55.5	0.250	0.300	0.180
% Hours w/Wind Direction from Expected ZOI[a]	%	66.7	79.2	75.0	20.8	58.3	8.3	0.0	0.0	20.8	50.0	25.0	16.7	0.0	75.0	16.7	25.0	79.2	58.3	25.0	0.0	20.8
Wind Speed (avg. of hourly speeds)	mph	3.7	4.1	3.1	2.6	5.4	1.7	4.3	5.9	2.2	10.1	6.0	5.2	3.3	4.4	5.8	6.5	2.4	3.1	3.5	1.7	7.7
Wind Direction (avg. of unitized vector)[b]	deg.	243.6	218.9	181.2	310.2	227.0	7.7	71.9	38.5	138.9	229.6	240.6	289.6	18.4	219.6	252.5	279.3	194.7	229.9	291.3	68.4	283.0
% of Hours with Speed below 2 knots	%	20.8	12.5	29.2	41.7	4.2	70.8	29.2	0.0	75.0	0.0	0.0	0.0	16.7	20.8	0.0	4.2	41.7	37.5	12.5	75.0	0.0
Allegheny County Airport NWS Station																						
Daily Average Temperature	° F	68.7	71.3	78.4	64.7	69.2	67.6	64.5	64.0	68.0	58.9	54.3	52.6	37.5	60.0	53.6	45.8	57.1	56.8	48.3	48.6	39.4
Daily Precipitation	inches	0.00	0.50	0.00	0.10	0.22	0.00	0.01	0.00	0.22	0.11	0.00	0.18	0.22	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.24

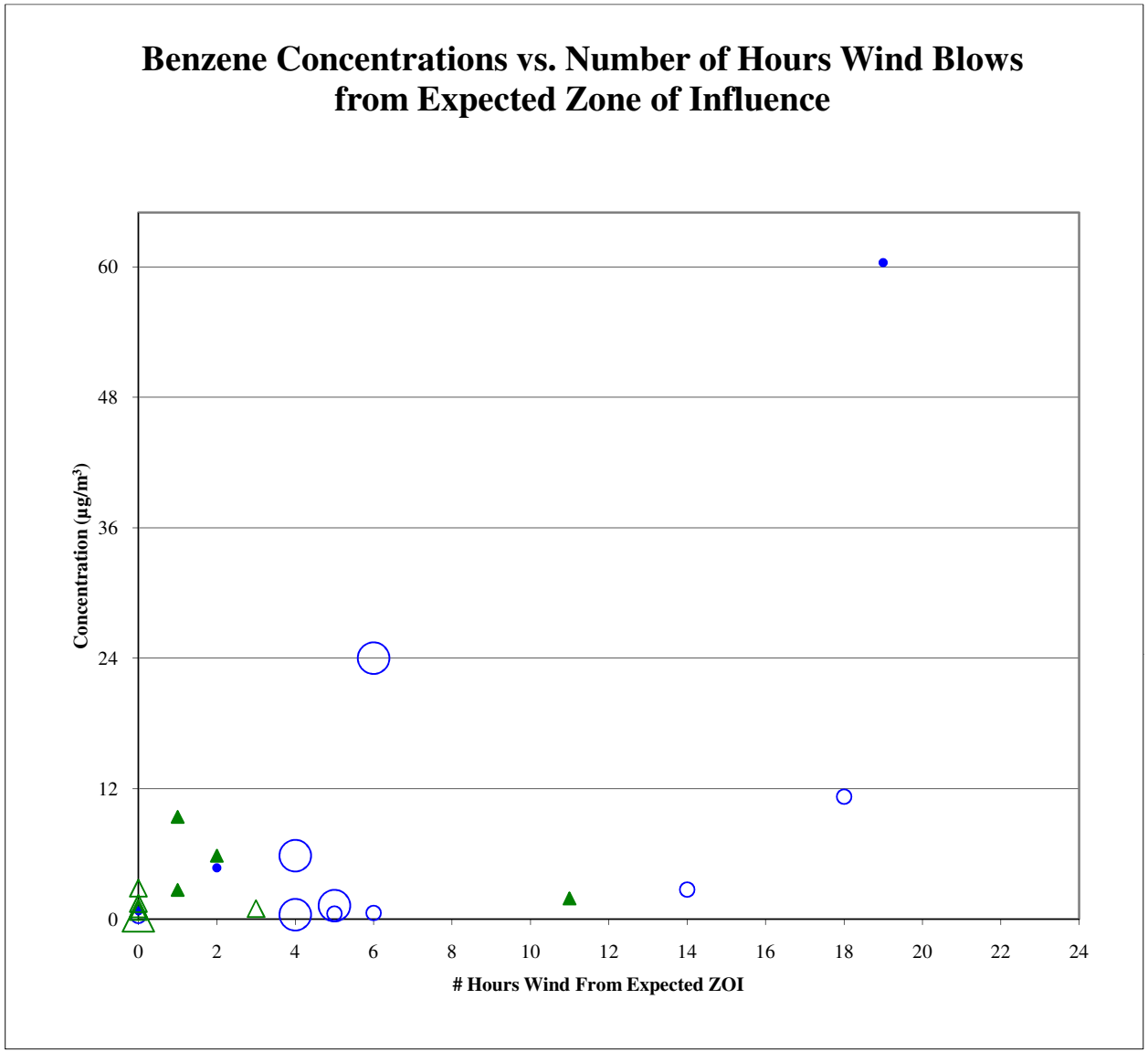
All precipitation and temperature data were from the Allegheny County Airport NWS Station.

[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).

-- No sample was conducted for this pollutant on this day or the result was invalidated.

Figure 3a. Clairton Educational Center and South Allegheny Middle/High School - Benzene Concentration and Wind Information.



KEY

Clairton Educational Center

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

South Allegheny Middle School/High School

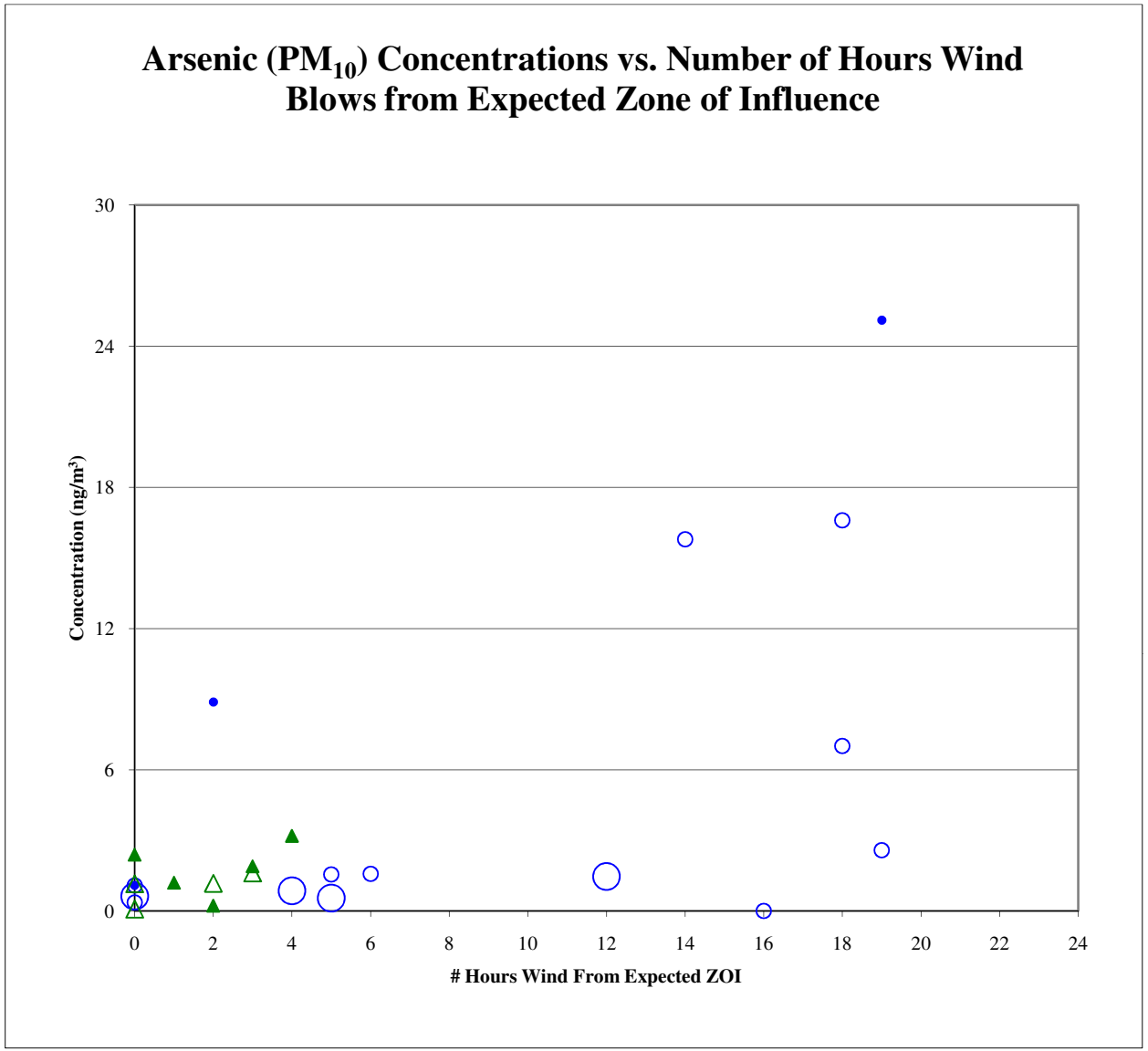
- Wind Speed: 0.1-2.5 mph
- Wind Speed: 2.5-5.0 mph
- Wind Speed: > 5.0 mph

Pollutant: Benzene
Timeframe: Aug. 23, 2009 - Dec. 21, 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 2a). The expected zone of source influence is a rough approximation of the range of directions from which winds carrying chemicals emitted by the key source may originate.

Figure 3b. Clairton Educational Center and South Allegheny Middle/High School - Arsenic (PM_{10}) Concentration and Wind Information.



KEY

Clairton Educational Center

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

South Allegheny Middle School/ High School

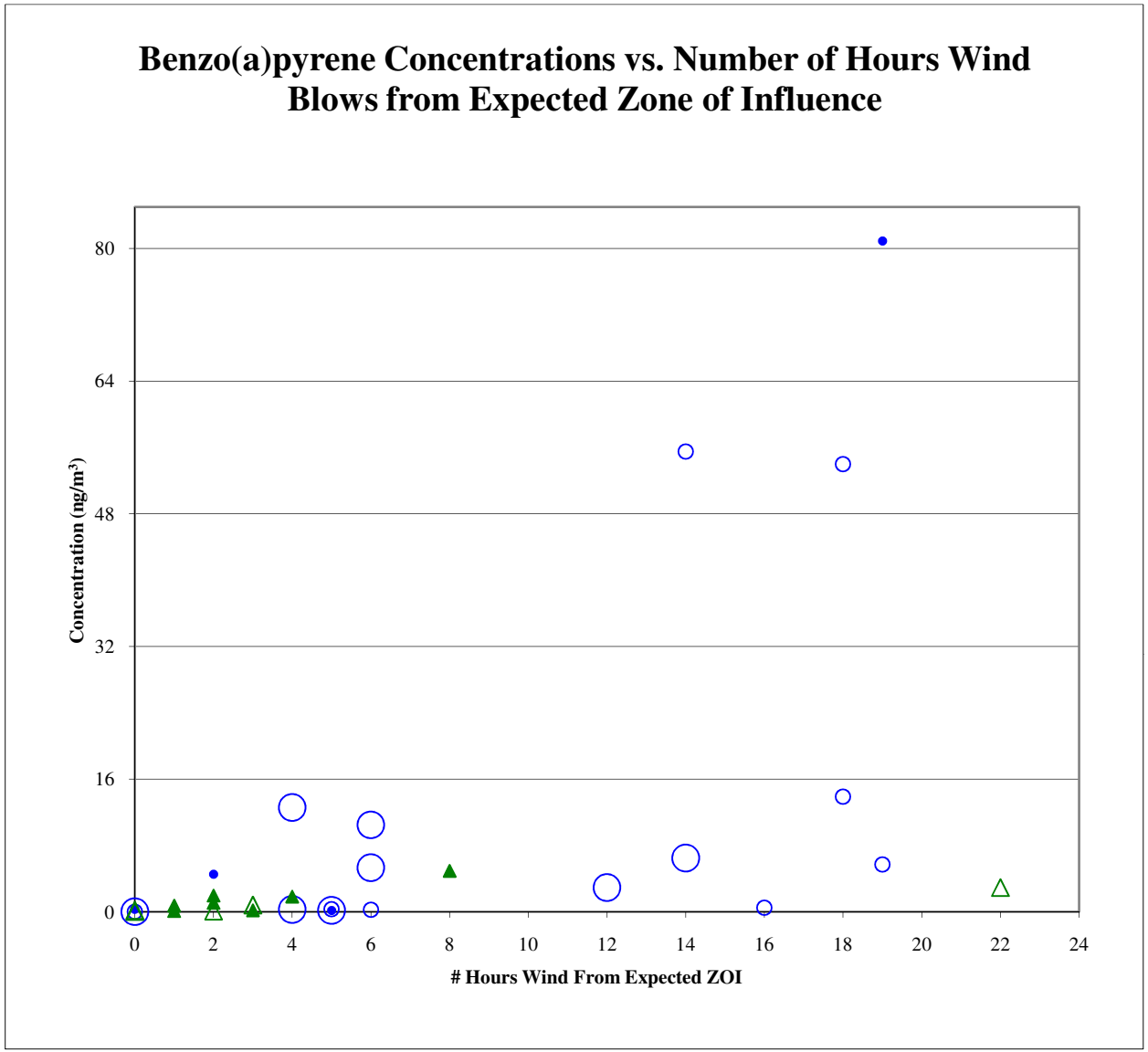
- ● Wind Speed: 0.1-2.5 mph
- ○ Wind Speed: 2.5-5.0 mph
- ○ Wind Speed: > 5.0 mph

Pollutant: Arsenic (PM_{10})
Timeframe: Aug. 5, 2009 - Nov. 30, 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 2b). The expected zone of source influence is a rough approximation of the range of directions from which winds carrying chemicals emitted by the key source may originate.

Figure 3c. Clairton Educational Center and South Allegheny Middle/High School - Benzo(a)pyrene Concentration and Wind Information.



KEY

Clairton Educational Center

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

South Allegheny Middle School/ High School

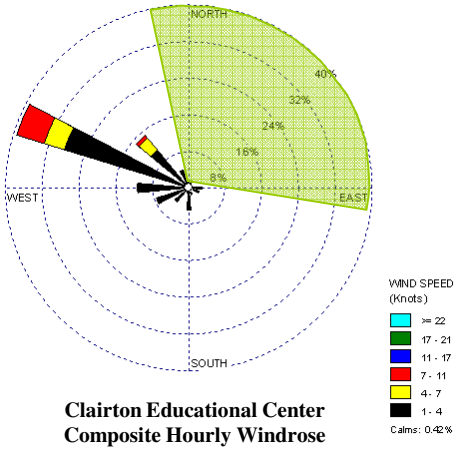
- Wind Speed: 0.1-2.5 mph
- Wind Speed: 2.5-5.0 mph
- Wind Speed: > 5.0 mph

Pollutant: Benzo(a)pyrene
Timeframe: Aug. 5, 2009 - Nov. 30, 2009

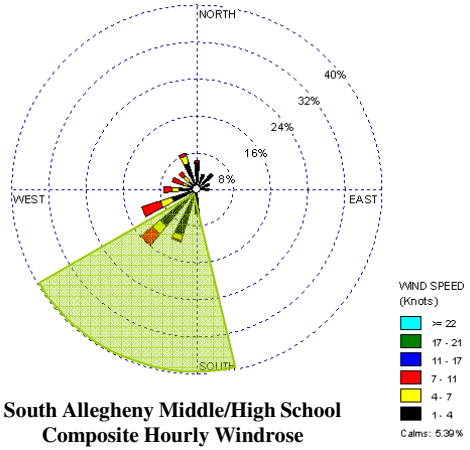
Note

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 2b). The expected zone of source influence is a rough approximation of the range of directions from which winds carrying chemicals emitted by the key source may originate.

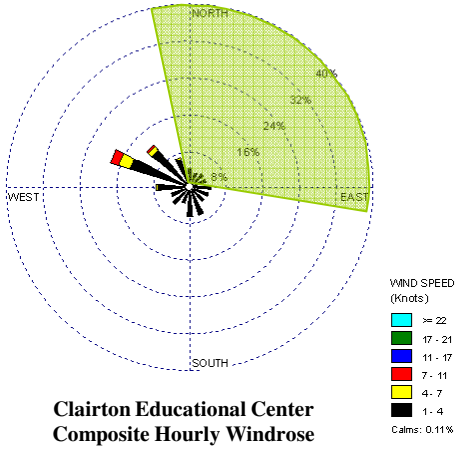
Figure 4a. Clairton Educational Center and South Allegheny Middle/High School - Wind Information (Benzene).



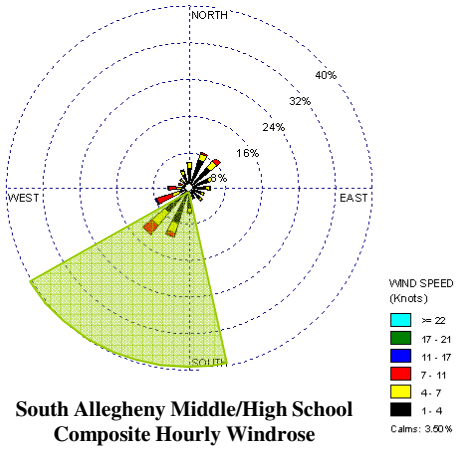
Clairton Educational Center
Composite Hourly Windrose
on Sample Days
(Oct. 22, 2009-Dec. 21, 2009)



South Allegheny Middle/High School
Composite Hourly Windrose
on Sample Days
(Aug. 23, 2009-Nov. 30, 2009)



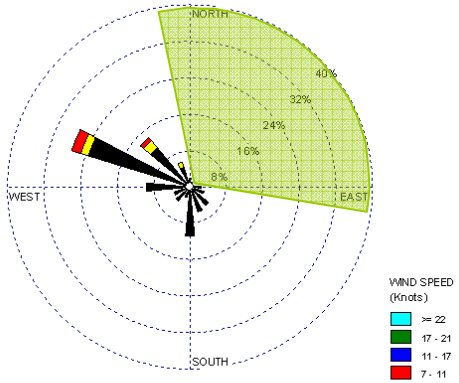
Clairton Educational Center
Composite Hourly Windrose
Across Sampling Period
(Sep. 4, 2009-Dec. 21, 2009)



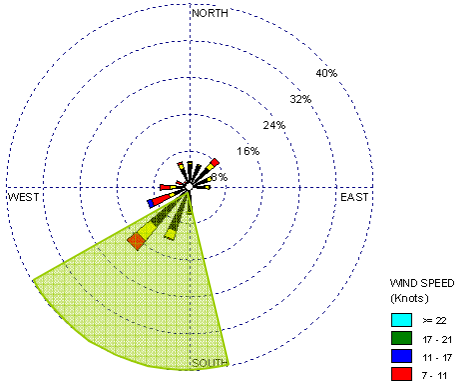
South Allegheny Middle/High School
Composite Hourly Windrose
Across Sampling Period
(Aug. 5, 2009-Nov. 30, 2009)

Expected Zone of Source Influence

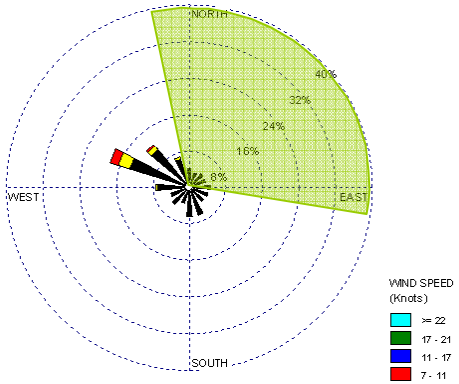
Figure 4b. Clairton Educational Center and South Allegheny Middle/High School - Wind Information (Arsenic (PM_{10})).



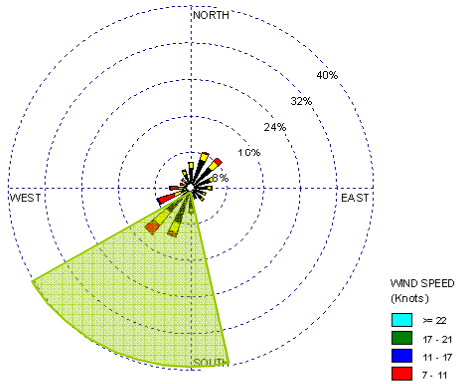
Clairton Educational Center
Composite Hourly Windrose
on Sample Days
(Sep. 22, 2009-Nov. 21, 2009)



South Allegheny Middle/High School
Composite Hourly Windrose
on Sample Days
(Aug. 5, 2009-Nov. 30, 2009)



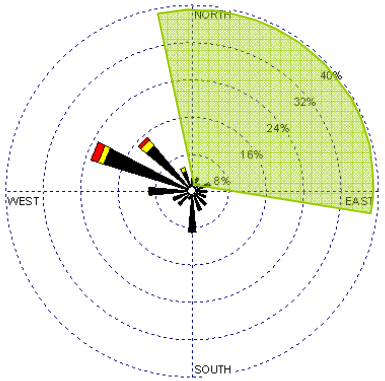
Clairton Educational Center
Composite Hourly Windrose
Across Sampling Period
(Sep. 4, 2009-Dec. 21, 2009)



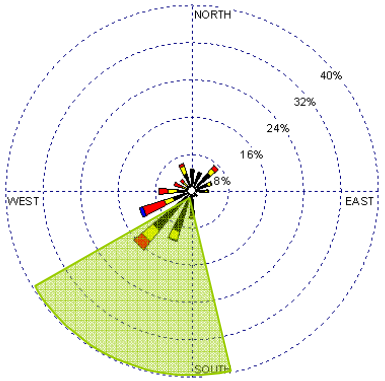
South Allegheny Middle/High School
Composite Hourly Windrose
Across Sampling Period
(Aug. 5, 2009-Nov. 30, 2009)

Expected Zone of Source Influence

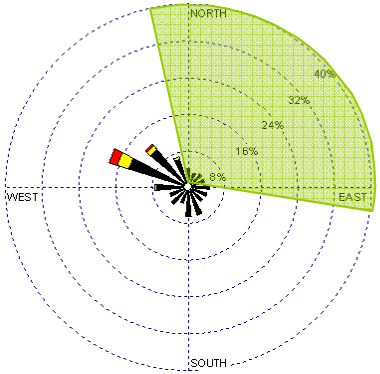
Figure 4c. Clairton Educational Center and South Allegheny Middle/High School - Wind Information (Benzo(a)pyrene).



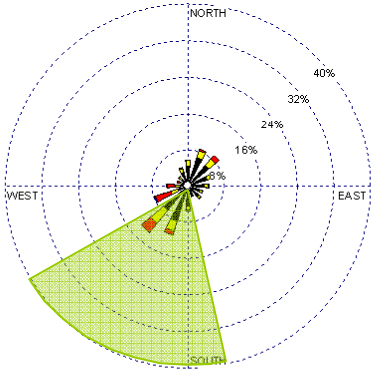
Clairton Educational Center
Composite Hourly Windrose
on Sample Days
(Sep. 4, 2009-Nov. 21, 2009)



South Allegheny
Middle/High School
Composite Hourly Windrose
on Sample Days
(Aug. 5, 2009-Nov. 30, 2009)



Clairton Educational Center
Composite Hourly Windrose
Across Sampling Period
(Sep. 4, 2009-Dec. 21, 2009)



South Allegheny Middle/High School
Composite Hourly Windrose
Across Sampling Period
(Aug. 5, 2009-Nov. 30, 2009)

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.[23]

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.[24] 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.

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

[24] 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 effects over a lifetime.[25] 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.

[25] 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
Antimony (PM_{10})	ng/m^3	2,372	94%	43.30	1.71	1.21	ND	0.60	1.13	2.17	4.33
Arsenic (PM_{10})	ng/m^3	5,076	86%	47.70	0.93	0.70	ND	0.29	0.56	1.02	2.89
Beryllium (PM_{10})	ng/m^3	4,771	64%	1.97	0.05	0.02	ND	ND	<0.01	0.02	0.50
Cadmium (PM_{10})	ng/m^3	4,793	85%	15.30	0.27	0.17	ND	0.05	0.13	0.29	0.94
Chromium (PM_{10})	ng/m^3	5,094	92%	172.06	2.71	1.66	ND	0.93	1.98	2.85	7.10
Cobalt (PM_{10})	ng/m^3	2,614	91%	20.30	0.28	0.18	ND	0.08	0.15	0.27	1.00
Manganese (PM_{10})	ng/m^3	4,793	99%	734.00	10.39	5.20	<0.01	2.41	4.49	9.96	33.78
Mercury (PM_{10})	ng/m^3	1,167	81%	2.07	0.07	0.04	ND	0.01	0.02	0.06	0.32
Nickel (PM_{10})	ng/m^3	4,815	90%	110.10	2.05	1.49	ND	0.74	1.44	2.50	5.74
Selenium (PM_{10})	ng/m^3	2,382	96%	13.00	1.10	0.53	<0.01	0.24	0.53	1.07	5.50
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

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
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
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
Benzo(a)anthracene (total tsp & vapor)	ng/m^3	1,122	73%	2.56	0.10	0.07	ND	ND	0.04	0.10	0.35
Benzo(a)pyrene (total tsp & vapor)	ng/m^3	1,111	58%	2.64	0.09	0.09	ND	ND	0.03	0.10	0.34
Benzo(b)fluoranthene	ng/m^3	1,110	86%	4.63	0.19	0.13	ND	0.04	0.10	0.21	0.67
Benzo(k)fluoranthene	ng/m^3	1,122	67%	1.28	0.05	0.05	ND	ND	0.02	0.06	0.20
Chrysene (total tsp & vapor)	ng/m^3	1,117	92%	3.85	0.22	0.15	ND	0.07	0.13	0.25	0.70
Dibenz(a,h)anthracene	ng/m^3	69	4%	0.08	<0.01	0.08	ND	ND	ND	ND	ND

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
Indeno(1,2,3-cd)pyrene	ng/m^3	69	51%	0.55	0.06	0.08	ND	ND	0.02	0.07	0.30
Naphthalene (total tsp & vapor)	$\mu g/m^3$	1,099	100%	0.54	0.08	0.05	<0.01	0.03	0.06	0.10	0.20

Key Pollutant

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 75^{th} 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 Schools and Multiple-pollutant Considerations.

At each school, monitoring has been targeted to get information on a limited set of key hazardous air pollutants (HAPs).[26] 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?

  → The longer-term concentration estimates for the other HAPs monitored at each school are below their long-term comparison levels.

  - For pollutants with cancer-based comparison levels, the longer-term concentration estimates across the two schools for all but two of these pollutants (naphthalene and chromium) are more than 10-fold lower and all but thirteen are more than 100-fold lower than the cancer-based comparison levels.[27] Among this total of thirteen pollutants, twelve are identified from the S. Allegheny results and eight from the Clairton results (with some pollutants in this group being common to both schools' results).
  - However, as described in the Multiple Pollutants section below, levels of naphthalene considered in combination with levels of the key pollutants, benzene, arsenic and benzo(a)pyrene, indicate a potential for levels of concern for long-term continuous exposure to this mixture of pollutants in the air.

  → 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.[28]

[26] 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.

[27] For pollutants with cancer-based comparison levels, this would indicate longer-term estimates below continuous (24 hours a day, 7 days a week) lifetime exposure concentrations associated with 10^{-5} and 10^{-6} excess cancer risk, respectively.

[28] 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*.

Additional Information on Thirteen HAPs:

- The first HAP mentioned above is naphthalene. The mean and 95 percent upper bound on the mean for naphthalene are approximately 50-80% and 15-30% of the cancer-based comparison level at S. Allegheny and Clairton, respectively. A review of information available at other sites nationally shows that the mean concentrations of naphthalene at each school is above the 95th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

- The second HAP mentioned above is chromium. The comparison values for chromium are conservatively based on the most toxic form of chromium (hexavalent chromium, Cr^{+6}), which is only a fraction of the chromium in the ambient air. Nonetheless, the longer-term concentration estimate for chromium (PM_{10}) is below even these very restrictive comparison values. For both schools, the mean and 95 percent upper bound on the mean for chromium (PM_{10}) are approximately 25-40% of the cancer-based comparison level. A review of information available at other sites nationally shows that the mean concentrations of chromium (PM_{10}) at both schools is between the 50th and 75th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

- The third HAP mentioned above is 1,3-butadiene. For both schools, the mean and 95 percent upper bound on the mean for 1,3-butadiene are approximately 5-10% 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 both schools 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).

- The fourth HAP mentioned above is dibenz(a,h)anthracene. The mean and 95 percent upper bound on the mean for dibenz(a,h)anthracene at S. Allegheny are approximately 4-8% of the cancer-based comparison level (these values for Clairton are less than 1%). A review of information available at other sites nationally shows that the mean concentration of dibenz(a,h)anthracene at the S. Allegheny is greater than the 95th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

- The fifth HAP mentioned above is benzo(b)fluoranthene. The mean and 95 percent upper bound on the mean for benzo(b)fluoranthene at S. Allegheny are approximately 4-7% of the cancer-based comparison level (these values for Clairton are less than 1%). A review of information available at other sites nationally shows that the mean concentration of benzo(b)fluoranthene at the S. Allegheny is greater than the 95th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

- The sixth HAP mentioned above is carbon tetrachloride. For both schools, the mean and 95 percent upper bound on the mean for carbon tetrachloride are approximately 4% of the cancer-based comparison level. A review of information available at other sites

nationally shows that the mean concentration of carbon tetrachloride at both sites 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 seventh HAP mentioned above is *p*-dichlorobenzene. The mean and 95 percent upper bound on the mean for *p*-dichlorobenzene at Clairton are approximately 2-6% of the cancer-based comparison level (these values for S. Allegheny are less than 1%). A review of information available at other sites nationally shows that the mean concentration of *p*-dichlorobenzene at Clairton 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).

- The eighth HAP mentioned above is benzo(a)anthracene. The mean and 95 percent upper bound on the mean for benzo(a)anthracene at S. Allegheny are approximately 3-6% of the cancer-based comparison level (these values for Clairton are less than 1%). A review of information available at other sites nationally shows that the mean concentration of benzo(a)anthracene at the S. Allegheny is greater than the 95th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

- The ninth HAP mentioned above is indeno(1,2,3-cd)pyrene. The mean and 95 percent upper bound on the mean for indeno(1,2,3-cd)pyrene at S. Allegheny are approximately 2-3% of the cancer-based comparison level (these values for Clairton are less than 1%). A review of information available at other sites nationally shows that the mean concentration of indeno(1,2,3-cd)pyrene at the S. Allegheny is greater than the 95th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites (Appendix B).

- The last four HAPs mentioned above are tetrachloroethylene, benzo(k)fluoranthene, ethylbenzene, and cadmium. The mean and 95 percent upper bound on the mean for these four HAPs at S. Allegheny are approximately 1-2% of the cancer-based comparison levels. The mean and 95 percent upper bound on the mean for tetrachloroethylene and ethylbenzene at Clairton are approximately 1-2% of the cancer-based comparison levels (while these values for the other two HAPs are less than 1%). A review of information available at other sites nationally shows that the mean concentrations of: tetrachloroethylene and ethylbenzene at both schools are between the 50th and 75th percentile of samples collected from 2004 to 2008 (the most recently compiled period) at the NATTS sites; cadmium at S. Allegheny is between the 75th and 95th percentile of samples from 2004-2008 at the NATTS sites; and benzo(k)fluoranthene at S. Allegheny is greater than the 95th percentile of samples from 2004-2008 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.[29]

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)?

  → The data collected for naphthalene, and the key pollutants, benzene, arsenic (PM_{10}), and benzo(a) pyrene and the associated longer-term concentration estimates considered together indicate the potential for levels of concerns for cumulative health risk from these pollutants. The longer-term concentration estimates for benzene and naphthalene are more than ten percent of their lowest comparison levels. The lowest comparison levels for these pollutants are based on carcinogenic risk. Arsenic and benzo(a)pyrene also have long-term comparison levels based on carcinogenic risk. When aggregated as a group, the fractions of the cancer-based comparison levels comprised by the longer-term concentration estimates are greater than 100% at S. Allegheny and close to 100% at Clairton. This indicates the potential for levels of concern for long-term continuous exposure to the mixture of these pollutants, particularly at areas near the S. Allegheny community.

    - The long-term concentration estimate for chromium (PM_{10}) is also more than ten percent of its lowest comparison level. As described in the Other Air Toxics section above, however, this comparison level is based on the most toxic form of chromium, hexavalent chromium, which is generally only a small fraction of the total chromium in the ambient air.[30]

    - The long-term concentration estimates for manganese (PM_{10}) and 1,3-butadiene are also more than ten percent of their lowest comparison levels at both schools. However, these pollutants pose different types of risks and act on different targets in the body (nervous system and reproductive systems, respectively), reducing potential for contribution to cumulative health risk from these pollutants.

[29] General information on additional air pollutants is available at http://www.epa.gov/air/airpollutants.html.
[30] Hexavalent chromium is commonly a small fraction of the total chromium reported. The long-term comparison level for noncancer-based chromium is much higher than the cancer-based level and is based on risk of other effects posed to the respiratory system by hexavalent chromium in particulate form.

Table C-1. Clairton Educational Center and South Allegheny Middle/High School - Other Monitored Pollutant Analysis.

School	Parameter	Units	Mean of Measurements[a]	95% Confidence Interval on the Mean	Long-term Comparison Level[b]	
					Cancer-Based[c]	Noncancer-Based[d]
Clairton Educational Center	***Non-Key HAPs with mean greater than 10% of the lowest comparison level***					
	Chromium (PM_{10})	ng/m^3	2.22	1.82 - 2.61	8.3 [e]	100 [e]
	Manganese (PM_{10})	ng/m^3	8.68	3.19 - 14.2	NA	50
	Naphthalene	µg/m^3	0.47	0.09 - 0.85	2.9	3
	Non-Key HAPs with mean lower than 10% of the lowest comparison level					
	Butadiene, 1,3-	µg/m^3	0.14	0.04 - 0.24	3.3	2
	Carbon Tetrachloride	µg/m^3	0.67	0.62 - 0.72	17	100
	Cadmium (PM_{10})	ng/m^3	0.23	0.11 - 0.35	56	10
	Dichlorobenzene, *p-*	µg/m^3	0.20	0.00 - 0.52	9.1	800
	Tetrachloroethylene	µg/m^3	0.24	0.07 - 0.41	17	270
	Antimony (PM_{10})	ng/m^3	2.51	0.73 - 4.30	NA	200
	Chloromethane	µg/m^3	1.08	0.94 - 1.22	NA	90
	Xylene, *m/p-*	µg/m^3	1.19	0.19 - 2.19	NA	100
	Ethylbenzene	µg/m^3	0.41	0.14 - 0.76	40	1,000
	Bromomethane	µg/m^3	0.04	0.03 - 0.05	NA	5
	Nickel (PM_{10})	ng/m^3	0.55	0.32 - 0.78	420	90
	Benzo (b) fluoranthene	ng/m^3	2.65	0.70 - 4.60	570	NA
	Xylene, *o-*	µg/m^3	0.42	0.08 - 0.75	NA	100
	Carbon Disulfide	µg/m^3	0.11	0.07 - 0.16	NA	700
	Benzo (a) anthracene	ng/m^3	2.32	0.63 - 4.01	570	NA
	Acetonitrile	µg/m^3	0.21	0.13 - 0.29	NA	60
	Dichloromethane	µg/m^3	0.50	0.38 - 0.62	210	1,000
	Indeno(1,2,3-cd)pyrene	ng/m^3	1.01	0.27 - 1.75	570	NA
	Cobalt (PM_{10})	ng/m^3	0.16	0.01 - 0.31	NA	100
	Styrene	µg/m^3	0.17	0.01 - 0.33	NA	1,000
	Benzo (k) fluoranthene	ng/m^3	0.82	0.22 - 1.42	570	NA
	Chloroform	µg/m^3	0.14	0.08 - 0.20	NA	98
	Methyl isobutyl ketone	µg/m^3	0.32	0.03 - 0.61	NA	3,000
	Toluene	µg/m^3	2.64	0.91 - 4.36	NA	5,000
	Chrysene	ng/m^3	2.95	0.77 - 5.14	5700	NA
	Methyl Chloroform	µg/m^3	0.09	0.06 - 0.11	NA	5,000
	Selenium (PM_{10})	ng/m^3	7.04	0 - 16.9	NA	20,000
	Dibenz (a,h) anthracene	ng/m^3	0.21 [f]	0.04 - 0.39 [f]	52	NA
	Mercury (PM_{10})	ng/m^3	0.01 [g]	0 - 0.03 [h]	NA	300 [h]
	Beryllium (PM_{10})	ng/m^3	0.01 [i]	0.001 - 0.02 [i]	42	20
	Chloroethane	µg/m^3	0.02 [J]	0.01 - 0.03 [J]	NA	10,000
	Non-Key HAPs with more than 50% ND Results.					
	Acrylonitrile	µg/m^3	70% of the results were ND[k]		1.5	2
	Vinyl chloride	µg/m^3	80% of the results were ND[l]		11	100
	Ethylene dichloride	µg/m^3	80% of the results were ND[m]		3.8	2,400
	Hexachloro-1,3-butadiene	µg/m^3	90% of the results were ND[n]		4.5	90
	Trichloroethylene	µg/m^3	80% of the results were ND[o]		50	600
	Methyl *tert-* Butyl Ether	µg/m^3	90% of the results were ND[p]		380	3,000
	No other HAPs were detected in any other samples.					

Table C-1. Clairton Educational Center and South Allegheny Middle/High School - Other Monitored Pollutant Analysis.

School	Parameter	Units	Mean of Measurements[a]	95% Confidence Interval on the Mean	Long-term Comparison Level[b]	
					Cancer-Based[c]	Noncancer-Based[d]
South Allegheny Middle School/High School	***Non-Key HAPs with mean greater than 10% of the lowest comparison level***					
	Naphthalene	µg/m^3	1.43	0.54 - 2.33	2.9	3
	Chromium (PM_{10})	ng/m^3	2.68	2.08 - 3.29	8.3 [e]	100 [e]
	Manganese (PM_{10})	ng/m^3	9.11	4.68 - 13.5	NA	50
	Non-Key HAPs with mean lower than 10% of the lowest comparison level					
	Butadiene, 1,3-	µg/m^3	0.14	0.01 - 0.28	3.3	2
	Dibenz (a,h) anthracene	ng/m^3	2.22	0.25 - 4.18	52	NA
	Cadmium (PM_{10})	ng/m^3	0.41	0.17 - 0.64	56	10
	Benzo (b) fluoranthene	ng/m^3	23.0	3.52 - 42.5	570	NA
	Carbon Tetrachloride	µg/m^3	0.65	0.59 - 0.71	17	100
	Benzo (a) anthracene	ng/m^3	17.4	2.40 - 32.3	570	NA
	Indeno(1,2,3-cd)pyrene	ng/m^3	9.67	1.68 - 17.7	570	NA
	Nickel (PM_{10})	ng/m^3	1.26	0.69 - 1.84	420	90
	Chloromethane	µg/m^3	1.12	0.95 - 1.29	NA	90
	Benzo (k) fluoranthene	ng/m^3	6.41	1.09 - 11.7	570	NA
	Tetrachloroethylene	µg/m^3	0.17	0.10 - 0.25	17	270
	Antimony (PM_{10})	ng/m^3	1.95	0.87 - 3.02	NA	200
	Xylene, *m/p-*	µg/m^3	0.88	0.17 - 1.60	NA	100
	Ethylbenzene	µg/m^3	0.28	0.09 - 0.47	40	1,000
	Bromomethane	µg/m^3	0.04	0.03 - 0.05	NA	5
	Acetonitrile	µg/m^3	0.28	0.17 - 0.40	NA	60
	Chrysene	ng/m^3	19.0	3.50 - 34.4	5,700	NA
	Xylene, *o-*	µg/m^3	0.27	0.08 - 0.47	NA	100
	Dichloromethane	µg/m^3	0.43	0.29 - 0.58	210	1,000
	Cobalt (PM_{10})	ng/m^3	0.13	0.03 - 0.22	NA	100
	Chloroform	µg/m^3	0.11	0.08 - 0.14	NA	98
	Toluene	µg/m^3	2.97	0.43 - 5.50	NA	5,000
	Selenium (PM_{10})	ng/m^3	6.25	0.61 - 11.9	NA	20,000
	Carbon Disulfide	µg/m^3	0.19	0.09 - 0.29	NA	700
	Styrene	µg/m^3	0.19	0.03 - 0.35	NA	1,000
	Mercury (PM_{10})	ng/m^3	0.04	0.01 - 0.07	NA	300 [h]
	Methyl isobutyl ketone	µg/m^3	0.28	0.09 - 0.47	NA	3,000
	Methyl Chloroform	µg/m^3	0.06	0.05 - 0.08	NA	5,000
	Chloroethane	µg/m^3	0.03	0.01 - 0.05	NA	10,000
	Dichlorobenzene, *p-*	µg/m^3	0.04 [q]	0.01 - 0.06 [q]	9.1	800
	Beryllium (PM_{10})	ng/m^3	0.016 [r]	0.002 - 0.03 [r]	42	20
	Non-Key HAPs with more than 50% ND Results.					
	Acrylonitrile	µg/m^3	92% of the results were ND[s]		1.5	2
	Vinyl chloride	µg/m^3	83% of the results were ND[t]		11	100
	Trichloroethylene	µg/m^3	92% of the results were ND[u]		50	600
	Trichlorobenzene, 1,2,4-	µg/m^3	92% of the results were ND[v]		NA	200
	No other HAPs were detected in any other samples.					

Table C-1. Clairton Educational Center and South Allegheny Middle/High School - Other Monitored Pollutant Analysis.

µg/m^3 micrograms per cubic meter
ng/m^3 nanograms per cubic meter
NA Not applicable
ND No detection of this chemical was registered by the laboratory analytical equipment.

[a] Mean of measurements is the average of all sample results which include actual measured values. 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.

[c] Air toxics for which the upper 95% confidence limit on the mean concentration is above this cancer-based comparison 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] The comparison levels are specific to hexavalent chromium (recognized as the most toxic form) which is a fraction of the total chromium reported.

[f] Dibenz(a,h)anthracene was detected in 9 out of 13 samples, ranging from 0.0312 to 0.978 ng/m^3. The MDL range is from 0.036 to 0.0485 ng/m^3.

[g] Mercury (PM_{10}) was detected in 5 out of 10 samples, ranging from 0.006 to 0.09 ng/m^3. The MDL range is from 1.12 to 1.35 ng/m^3.

[h] The comparison level is specific to elemental mercury, which is more readily and completely absorbed into the body than mercury conveyed on particles (e.g., divalent species).

[i] Beryllium (PM_{10}) was detected in 6 out of 10 samples, ranging from 0.004 to 0.04 ng/m^3. The MDL range is from 0.03 to 0.04 ng/m^3.

[j] Chloroethane was detected in 6 out of 10 samples, ranging from 0.02 to 0.040 µg/m^3. The MDL range is from 0.005 to 0.0053 µg/m^3.

[k] Acrylonitrile was detected in only 1 out of 10 samples, with a value equal to 0.14 µg/m^3. The MDL range is from 0.033 to 0.0326 µg/m^3.

[l] Vinyl chloride was detected in only 2 out of 10 samples, both with a value equal to 0.02 µg/m^3. The MDL is 0.005 µg/m^3.

[m] Ethylene dichloride was detected in only 1 out of 10 samples with a value equal to 0.13 µg/m^3. The MDL is 0.008 µg/m^3.

[n] Hexachloro-1,3-butadiene was detected in only 1 out of 10 samples, with a value equal to 0.04 µg/m^3. The MDL is 0.128 µg/m^3.

[o] Trichloroethylene was detected in only 4 out of 10 samples, ranging from 0.054 to 0.086 µg/m^3. The MDL is 0.011 µg/m^3.

[p] Methyl *tert*-Butyl Ether was detected in only 2 out of 10 samples, ranging from 0.02 to 0.03 µg/m^3. The MDL is 0.05 µg/m^3.

[q] Dichlorobenzene, *p*- was detected in 7 out of 12 samples, ranging from 0.04 to 0.11 µg/m^3. The MDL range is from 0.024 to 0.096 µg/m^3.

[r] Beryllium (PM_{10}) was detected in 10 out of 16 samples, ranging from 0.0008 to 0.09 ng/m^3. The MDL range is from 0.03 to 0.04 ng/m^3.

[s] Acrylonitrile was detected in only 1 out of 12 samples, with a value equal to 0.14 µg/m^3. The MDL range is from 0.033 to 0.13 µg/m^3.

[t] Vinyl chloride was detected in only 2 out of 12 samples, ranging from 0.01 to 0.02 µg/m^3. The MDL range is from 0.005 to 0.020 µg/m^3.

[u] Trichloroethylene was detected in only 1 out of 12 samples, with a value equal to 0.070 µg/m^3. The MDL range is from 0.011 to 0.043 µg/m^3.

[v] Trichlorobenzene, 1,2,4- was detected in only 1 out of 12 samples, with a value equal to 0.04 µg/m^3. The MDL range is from 0.052 to 0.21 µg/m^3.

Appendix D. Clairton Educational Center and South Allegheny Middle/High School - Pollutant Concentrations.

School Name	Parameter	Units	8/5/2009	8/11/2009	8/17/2009	8/23/2009	8/29/2009	9/4/2009	9/10/2009	9/16/2009	9/22/2009	9/28/2009	10/4/2009	10/10/2009	10/16/2009	10/22/2009	10/28/2009	11/3/2009	11/9/2009	11/15/2009	11/21/2009	11/24/2009	11/30/2009	12/10/2009	12/14/2009	12/17/2009	12/21/2009	Sample Screening Level[a]
Clairton Educational Center	Benzene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	5.85	0.965	0.962	9.43	2.71	1.92	--	--	0.31	1.44	2.84	0.710	30
	Arsenic (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	1.21	0.08	2.40	1.18	3.20	0.23	1.62	1.16	ND	--	1.91	--	--	--	--	--	--	150
	Benzo(a)pyrene	ng/m^3	--	--	--	--	--	4.94	--	2.93	0.100	0.0400	ND	0.0800	1.84	1.09	0.820	0.180	1.96	0.750	0.180	--	--	--	--	--	--	6,400
	Chromium (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	2.40	1.89	2.00	1.67	1.68	2.41	2.46	2.99	3.15	--	1.52	--	--	--	--	--	--	580[b]
	Manganese (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	5.30	9.87	3.46	1.72	2.47	18.0	4.04	10.6	25.9	--	5.44	--	--	--	--	--	--	500
	Naphthalene	µg/m^3	--	--	--	--	--	2.220	--	0.961	0.105	0.0248	0.0530	0.0644	0.337	0.245	0.140	0.0944	0.985	0.784	0.121	--	--	--	--	--	--	30
	Butadiene, 1,3-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.20	0.055	0.11	0.491	ND	0.064	--	--	0.02	0.17	0.21	0.077	20
	Carbon Tetrachloride	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.636	0.674	0.711	0.774	0.57	0.60	--	--	0.61	0.699	0.762	0.680	200
	Cadmium (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	0.18	0.05	0.13	0.17	0.12	0.27	0.13	0.23	0.64	--	0.36	--	--	--	--	--	--	30
	Dichlorobenzene, *p*-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.14	0.05	0.072	0.15	0.05	ND	--	--	ND	ND	1.47	0.066	10,000
	Tetrachloroethylene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.52	0.18	0.22	0.801	0.14	0.14	--	--	ND	0.15	0.28	ND	1,400
	Antimony (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	2.08	0.51	2.22	0.99	1.01	4.09	0.89	1.87	9.08	--	2.40	--	--	--	--	--	--	2,000
	Chloromethane	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	1.27	1.21	1.02	1.37	0.967	0.965	--	--	0.839	0.944	1.35	0.886	1,000
	Xylene, *m/p*-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	3.582	0.404	0.782	4.04	0.578	0.365	--	--	0.074	1.19	0.625	0.230	9,000
	Ethylbenzene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	1.10	0.16	0.34	1.19	0.30	0.17	--	--	0.043	0.443	0.27	0.11	40,000
	Bromomethane	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.051	0.039	0.039	0.058	0.043	0.039	--	--	0.043	0.043	ND	0.03	200
	Nickel (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	0.87	0.48	0.22	0.23	0.29	0.98	0.45	0.57	1.12	--	0.29	--	--	--	--	--	--	200
	Benzo (b) fluoranthene	ng/m^3	--	--	--	--	--	11.4	--	6.34	0.380	0.150	0.200	0.170	4.35	2.54	2.09	0.480	3.57	2.34	0.440	--	--	--	--	--	--	64,000
	Xylene, *o* -	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	1.32	0.16	0.31	1.25	0.20	0.13	--	--	0.03	0.41	0.23	0.10	9,000
	Carbon Disulfide	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.15	0.056	0.062	0.20	0.11	0.072	--	--	0.02	0.24	0.11	0.12	7,000
	Benzo (a) anthracene	ng/m^3	--	--	--	--	--	9.77	--	5.21	0.240	0.0600	0.0700	0.150	3.18	2.90	1.72	0.210	3.79	2.58	0.250	--	--	--	--	--	--	64,000
	Acetonitrile	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.365	0.197	0.16	0.438	0.242	0.175	--	--	0.10	0.173	0.12	0.11	600
	Dichloromethane	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.605	0.428	0.487	0.817	0.619	0.372	--	--	0.23	0.657	0.459	0.348	2,000
	Indeno(1,2,3-cd)pyrene	ng/m^3	--	--	--	--	--	4.09	--	2.69	0.130	0.0636	0.100	0.0743	1.96	0.737	0.862	0.197	1.28	0.778	0.178	--	--	--	--	--	--	64,000
	Cobalt (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	0.07	0.09	0.56	ND	0.01	0.13	0.03	0.09	0.58	--	0.04	--	--	--	--	--	--	100
	Styrene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.644	0.072	0.17	0.520	0.051	0.060	--	--	ND	0.081	0.077	ND	9,000
	Benzo (k) fluoranthene	ng/m^3	--	--	--	--	--	3.50	--	1.83	0.110	0.0400	0.0500	0.0500	1.35	0.820	0.690	0.120	1.16	0.850	0.120	--	--	--	--	--	--	64,000
	Chloroform	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.13	0.12	0.13	0.38	0.13	0.11	--	--	0.073	0.10	0.14	0.11	500
	Methyl isobutyl ketone	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	1.30	0.648	0.439	0.471	ND	0.15	--	--	ND	0.14	0.057	ND	30,000
	Toluene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	5.28	1.07	3.17	8.30	2.04	1.28	--	--	0.34	2.68	1.49	0.709	4,000
	Chrysene	ng/m^3	--	--	--	--	--	13.2	--	6.31	0.720	0.170	0.190	0.150	3.46	3.97	2.21	0.420	3.84	3.27	0.490	--	--	--	--	--	--	640,000
	Methyl chloroform	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.11	0.082	0.076	0.16	0.071	0.071	--	--	0.066	0.093	0.082	0.055	10,000
	Selenium (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	1.21	1.31	0.47	0.70	1.10	14.6	1.48	2.26	45.2	--	2.07	--	--	--	--	--	--	20,000
	Dibenz (a,h) anthracene	ng/m^3	--	--	--	--	--	0.978	--	0.564	ND	ND	ND	ND	0.408	0.165	0.200	0.0347	0.244	0.130	0.0312	--	--	--	--	--	--	5,800
	Mercury (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	ND	0.006	ND	ND	ND	0.02	ND	0.007	0.09	--	0.02	--	--	--	--	--	--	3,000[c]
	Beryllium (PM_{10})	ng/m^3	--	--	--	--	--	--	--	--	ND	ND	0.01	ND	0.004	0.04	0.006	0.02	0.02	--	ND	--	--	--	--	--	--	20

Appendix D. Clairton Educational Center and South Allegheny Middle/High School - Pollutant Concentrations.

School Name	Parameter	Units	8/5/2009	8/11/2009	8/17/2009	8/23/2009	8/29/2009	9/4/2009	9/10/2009	9/16/2009	9/22/2009	9/28/2009	10/4/2009	10/10/2009	10/16/2009	10/22/2009	10/28/2009	11/3/2009	11/9/2009	11/15/2009	11/21/2009	11/24/2009	11/30/2009	12/10/2009	12/14/2009	12/17/2009	12/21/2009	Sample Screening Level[a]
Clairton Educational Center	Chloroethane	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.032	0.02	0.026	0.040	0.02	0.02	--	--	ND	ND	ND	ND	40,000
	Acrylonitrile	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.14	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	200
	Vinyl chloride	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.02	ND	ND	0.02	ND	ND	--	--	ND	ND	ND	ND	1,000
	Ethylene dichloride	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	0.13	ND	ND	--	--	ND	ND	ND	ND	270
	Hexachloro-1,3-butadiene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	0.04	ND	ND	ND	ND	--	--	ND	ND	ND	ND	320
	Trichloroethylene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.075	0.054	ND	0.086	ND	ND	--	--	ND	ND	0.059	ND	10,000
	Methyl *tert*- Butyl Ether	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	ND	ND	0.02	ND	ND	--	--	ND	ND	ND	ND	7,000
	Benzyl Chloride	µg/m^3	--	--	--	--	--	--		--	--	--	--	--	--	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	6,400
	Chlorobenzene	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	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	200
	Ethylene dibromide	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	12
	Dichloroethane, 1,1-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	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	80
	Dichloropropane, 1,2-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	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	40
	Dichloropropylene, *trans* -1,3-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	40
	Ethyl Acrylate	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	ND	ND	ND	ND	ND	--	--	ND	ND	ND	ND	7,000
	Methyl Methacrylate	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	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	120
	Trichlorobenzene, 1,2,4-	µg/m^3	--	--	--	--	--	--	--	--	--	--	--	--	--	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	440
South Allegheny Middle School/High School	Benzene	µg/m^3	--	--	--	0.511	--	4.73	--	--	--	--	--	5.85	0.30	11.3	0.409	24.0	60.4	2.73	0.585	0.774	1.25	--	--	--	--	30
	Arsenic (PM_{10})	ng/m^3	ND	2.58	7.01	1.55	--	8.88	1.08	0.63	--	1.47	--	--	0.37	16.6	0.86	--	25.1	15.8	1.58	1.09	0.55	--	--	--	--	150
	Benzo(a)pyrene	ng/m^3	0.510	5.72	13.9	0.350	6.49	4.55	ND	0.0300	0.170	2.93	5.33	12.6	0.0300	54.0	0.300	10.5	80.9	55.5	0.250	0.300	0.180	--	--	--	--	6,400
	Naphthalene	µg/m^3	0.520	1.590	2.840	0.259	0.905	1.450	0.0522	0.0599	0.176	0.337	0.797	1.160	0.0360	4.000	0.169	2.380	7.570	5.050	0.443	0.149	0.132	--	--	--	--	30
	Chromium (PM_{10})	ng/m^3	2.04	2.83	3.01	1.87	--	5.60	2.60	3.18	--	1.88	--	--	2.96	4.39	1.65	--	3.45	2.68	2.22	1.21	1.34	--	--	--	--	580[b]
	Manganese (PM_{10})	ng/m^3	0.40	4.60	14.0	3.35	--	30.3	6.07	13.7	--	9.07	--	--	1.68	20.1	2.34	--	18.9	10.6	4.77	3.68	2.19	--	--	--	--	500
	Butadiene, 1,3-	µg/m^3	--	--	--	0.02	--	0.15	--	--	--	--	--	0.12	0.02	0.17	0.024	0.359	0.759	0.062	0.029	0.035	ND	--	--	--	--	20
	Dibenz (a,h) anthracene	ng/m^3	0.09	0.90	2.50	0.07	0.95	1.07	ND	ND	ND	0.52	1.07	1.31	ND	9.90	0.08	1.80	16.40	9.76	0.05	0.08	0.03	--	--	--	--	5,800
	Cadmium (PM_{10})	ng/m^3	0.01	0.14	0.53	0.38	--	0.56	0.16	0.18	--	0.08	--	--	0.07	0.92	0.16	--	1.55	1.17	0.40	0.12	0.10	--	--	--	--	30
	Benzo (b) fluoranthene	ng/m^3	1.49	11.4	26.9	1.05	12.0	11.4	ND	0.0800	0.670	5.44	11.1	18.2	0.110	92.3	1.10	19.5	162	106	0.740	1.26	0.430	--	--	--	--	64,000
	Carbon Tetrachloride	µg/m^3	--	--	--	0.781	--	0.787	--	--	--	--	--	0.680	0.680	0.62	0.699	0.768	0.51	0.629	0.55	0.58	0.52	--	--	--	--	200
	Benzo (a) anthracene	ng/m^3	2.90	8.00	15.2	1.38	9.69	6.33	0.0800	0.0800	0.620	4.06	8.31	14.7	0.0700	69.8	0.980	14.1	125	81.6	0.570	0.850	0.410	--	--	--	--	64,000
	Indeno(1,2,3-cd)pyrene	ng/m^3	0.44	5.67	12.6	0.43	5.65	4.76	ND	ND	0.24	2.94	5.43	5.12	0.04	43.0	0.41	8.37	63.4	43.7	0.27	0.40	0.15	--	--	--	--	64,000
	Nickel (PM_{10})	ng/m^3	0.26	0.58	2.33	0.04	--	1.94	1.88	2.94	--	2.15	--	--	1.05	2.30	0.48	--	3.07	0.75	0.35	0.07	0.02	--	--	--	--	200

Appendix D. Clairton Educational Center and South Allegheny Middle/High School - Pollutant Concentrations.

School Name	Parameter	Units	8/5/2009	8/11/2009	8/17/2009	8/23/2009	8/29/2009	9/4/2009	9/10/2009	9/16/2009	9/22/2009	9/28/2009	10/4/2009	10/10/2009	10/16/2009	10/22/2009	10/28/2009	11/3/2009	11/9/2009	11/15/2009	11/21/2009	11/24/2009	11/30/2009	12/10/2009	12/14/2009	12/17/2009	12/21/2009	Sample Screening Level[a]
South Allegheny Middle School/High School	Chloromethane	µg/m^3	--	--	--	1.47	--	1.38	--	--	--	--	--	1.27	0.684	1.30	1.46	1.24	0.959	0.998	0.864	1.00	0.820	--	--	--	--	1,000
	Benzo (k) fluoranthene	ng/m^3	0.470	3.59	7.12	0.300	3.5	3.27	ND	0.0300	0.200	1.92	2.98	5.92	0.0400	27.6	0.320	5.62	44.5	26.5	0.190	0.400	0.150	--	--	--	--	64,000
	Tetrachloroethylene	µg/m^3	--	--	--	0.04	--	0.33	--	--	--	--	--	0.12	0.14	0.29	0.26	0.15	0.37	0.16	0.10	0.12	ND	--	--	--	--	1,400
	Antimony (PM_{10})	ng/m^3	0.05	0.83	2.17	0.7	--	3.17	1.24	0.86	--	0.48	--	--	0.49	3.76	0.86	--	7.60	5.01	1.72	1.69	0.52	--	--	--	--	2,000
	Xylene, *m/p-*	µg/m^3	--	--	--	0.122	--	1.06	--	--	--	--	--	0.773	0.134	2.28	0.208	1.20	3.85	0.473	0.191	0.182	0.135	--	--	--	--	9,000
	Ethylbenzene	µg/m^3	--	--	--	0.056	--	0.31	--	--	--	--	--	0.23	0.065	0.682	0.087	0.39	1.05	0.25	0.10	0.10	0.078	--	--	--	--	40,000
	Bromomethane	µg/m^3	--	--	--	0.043	--	0.047	--	--	--	--	--	0.043	0.039	0.039	0.039	0.043	0.051	0.047	0.03	0.039	ND	--	--	--	--	200
	Acetonitrile	µg/m^3	--	--	--	0.309	--	0.477	--	--	--	--	--	0.210	0.202	0.403	0.215	0.410	0.669	0.222	0.14	0.14	ND	--	--	--	--	600
	Chrysene	ng/m^3	3.96	10.0	18.3	1.46	10.8	10.0	0.320	0.390	1.39	4.87	10.1	14.0	0.150	77.4	1.66	15.9	125	88.7	1.14	1.73	0.720	--	--	--	--	640,000
	Xylene, *o-*	µg/m^3	--	--	--	0.070	--	0.43	--	--	--	--	--	0.25	0.052	0.808	0.083	0.35	0.947	0.16	0.074	0.074	ND	--	--	--	--	9,000
	Dichloromethane	µg/m^3	--	--	--	0.417	--	1.09	--	--	--	--	--	0.26	0.379	0.368	0.421	0.407	0.34	0.633	0.29	0.30	0.29	--	--	--	--	2,000
	Cobalt (PM_{10})	ng/m^3	ND	0.06	0.09	ND	--	0.15	0.09	0.19	--	0.05	--	--	0.02	0.24	0.01	--	0.73	0.16	0.03	0.05	0.18	--	--	--	--	100
	Chloroform	µg/m^3	--	--	--	0.12	--	0.18	--	--	--	--	--	0.098	0.11	0.098	0.098	0.13	0.18	0.11	ND	0.083	0.11	--	--	--	--	500
	Toluene	µg/m^3	--	--	--	0.34	--	2.81	--	--	--	--	--	2.98	0.475	4.49	0.607	5.81	14.5	1.51	0.713	0.754	0.645	--	--	--	--	4,000
	Selenium (PM_{10})	ng/m^3	0.10	2.87	3.84	0.65	--	3.31	0.54	1.40	--	1.84	--	--	0.34	16.9	1.03	--	32.3	30.8	1.48	1.61	1.04	--	--	--	--	20,000
	Carbon Disulfide	µg/m^3	--	--	--	0.12	--	0.19	--	--	--	--	--	0.455	0.15	0.19	0.14	0.19	0.545	0.14	0.037	0.034	0.059	--	--	--	--	7,000
	Styrene	µg/m^3	--	--	--	0.03	--	0.13	--	--	--	--	--	0.26	0.01	0.39	0.085	0.30	0.887	0.12	0.03	ND	ND	--	--	--	--	9,000
	Mercury (PM_{10})	ng/m^3	0.005	0.07	0.01	0.02	--	0.05	ND	0.04	--	0.02	--	--	ND	0.09	0.003	--	0.19	0.11	0.02	0.003	0.01	--	--	--	--	3,000[c]
	Methyl isobutyl ketone	µg/m^3	--	--	--	0.422	--	0.783	--	--	--	--	--	0.38	0.04	0.935	0.053	0.078	0.078	0.21	0.17	0.22	ND	--	--	--	--	30,000
	Methyl chloroform	µg/m^3	--	--	--	0.082	--	0.093	--	--	--	--	--	0.060	0.066	0.066	0.071	0.082	0.05	0.071	0.060	0.055	ND	--	--	--	--	10,000
	Chloroethane	µg/m^3	--	--	--	0.02	--	0.048	--	--	--	--	--	ND	0.026	0.02	0.032	0.12	0.02	0.02	0.02	ND	ND	--	--	--	--	40,000
	Dichlorobenzene, *p-*	µg/m^3	--	--	--	ND	--	0.066	--	--	--	--	--	0.072	0.05	0.11	0.04	0.04	0.060	ND	ND	ND	ND	--	--	--	--	10,000
	Beryllium (PM_{10})	ng/m^3	ND	0.03	0.005	ND	--	0.02	ND	0.002	--	0.01	--	--	0.002	0.09	0.0008	--	0.06	0.04	ND	ND	ND	--	--	--	--	20
	Acrylonitrile	µg/m^3	--	--	--	0.14	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	200
	Vinyl chloride	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	0.01	ND	0.02	ND	ND	ND	ND	ND	--	--	--	--	1,000
	Trichloroethylene	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	0.070	ND	ND	ND	ND	--	--	--	--	10,000
	Trichlorobenzene, 1,2,4-	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	0.04	ND	ND	ND	ND	--	--	--	--	2,000
	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	--	--	--	--	200
	Ethylene dibromide	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	12
	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	--	--	--	--	40

Appendix D. Clairton Educational Center and South Allegheny Middle/High School - Pollutant Concentrations.

School Name	Parameter	Units	8/5/2009	8/11/2009	8/17/2009	8/23/2009	8/29/2009	9/4/2009	9/10/2009	9/16/2009	9/22/2009	9/28/2009	10/4/2009	10/10/2009	10/16/2009	10/22/2009	10/28/2009	11/3/2009	11/9/2009	11/15/2009	11/21/2009	11/24/2009	11/30/2009	12/10/2009	12/14/2009	12/17/2009	12/21/2009	Sample Screening Level[a]
South Allegheny Middle School/High School	Dichloropropylene, *trans* -1,3-	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	40
	Ethyl Acrylate	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	7,000
	Ethylene dichloride	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	270
	Hexachloro-1,3-butadiene	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	320
	Methyl Methacrylate	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	7,000
	Methyl *tert*- Butyl Ether	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
	Trichloroethane, 1,1,2-	µg/m^3	--	--	--	ND	--	ND	--	--	--	--	--	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	440

Key Pollutant

ng/m^3 nanograms per cubic meter

µg/m^3 micrograms per cubic meter

ND No detection of this chemical was registered by the laboratory analytical equipment.

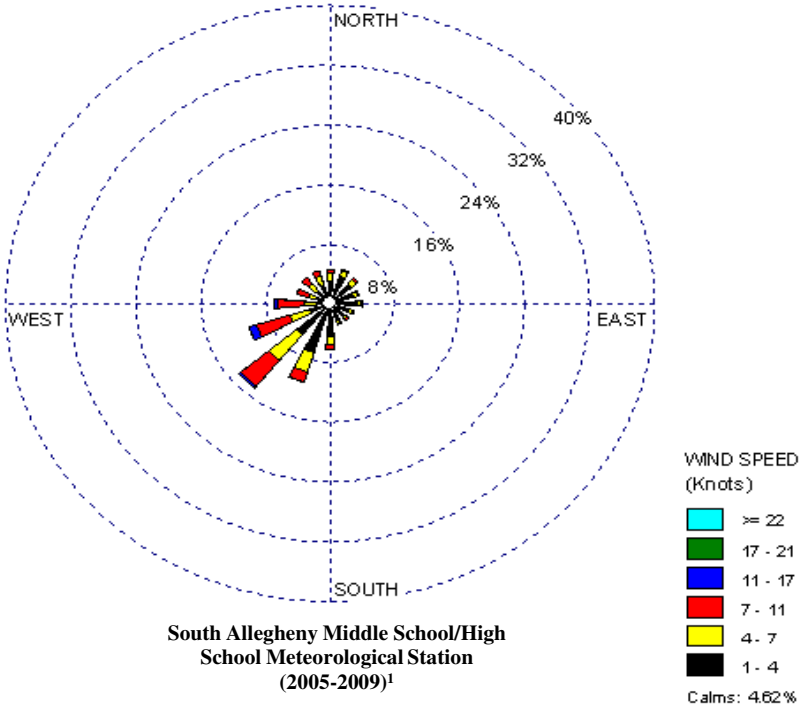
-- No sample was conducted for this pollutant on this day or the result was invalidated

[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. hese screening levels are based on consideration of exposure all day, every day over a period ranging up to a couple of weeks, and longer for some pollutants.

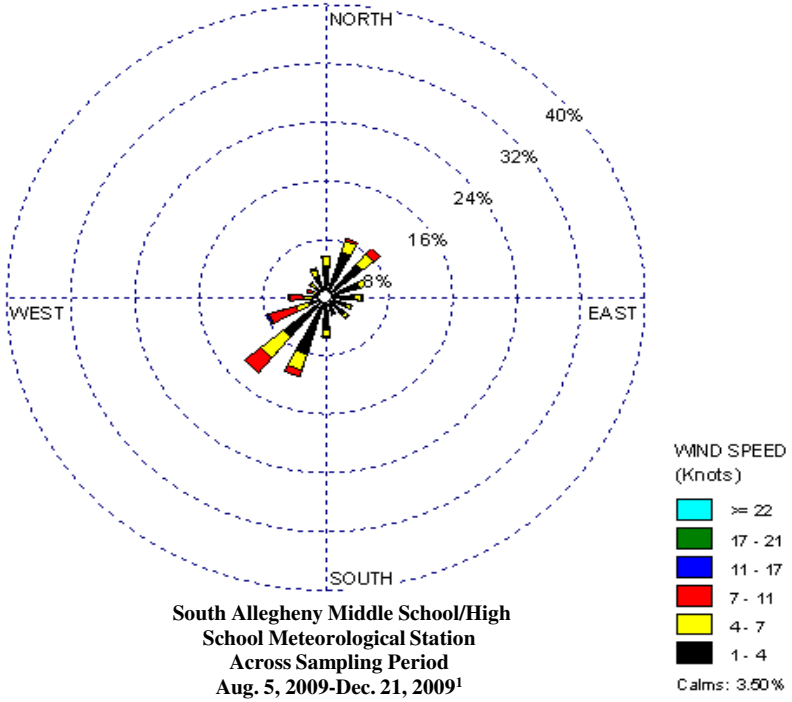
[b] The sample screening levels are specific to hexavalent chromium (recognized as the most toxic form) which is a fraction of the total chromium reported.

[c] The sample screening level is specific to elemental mercury, which is more readily and completely absorbed into the body than mercury conveyed on particles (e.g., divalent species).

Appendix E. Windroses for South Allegheny Middle School/High School Meteorological Station.



South Allegheny Middle School/High School Meteorological Station (2005-2009)[1]



South Allegheny Middle School/High School Meteorological Station Across Sampling Period Aug. 5, 2009-Dec. 21, 2009[1]

[1] Clairton Educational Center is located 2.28 miles south-southeast of South Allegheny Middle School/High School.