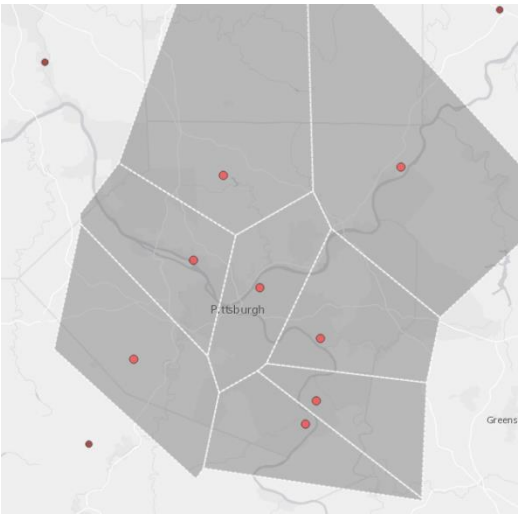
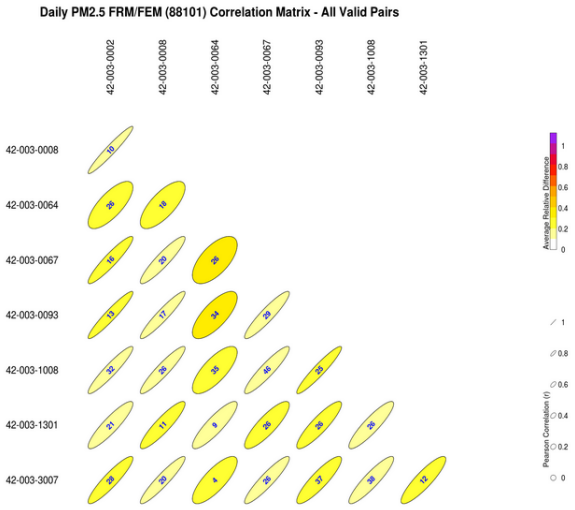
Allegheny County Health Department
Air Quality Program
301 39th St., Bldg. # 7
Pittsburgh, PA 15201

2015 Five-Year Monitoring Network Assessment





July 1, 2015

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APPENDIX A-1

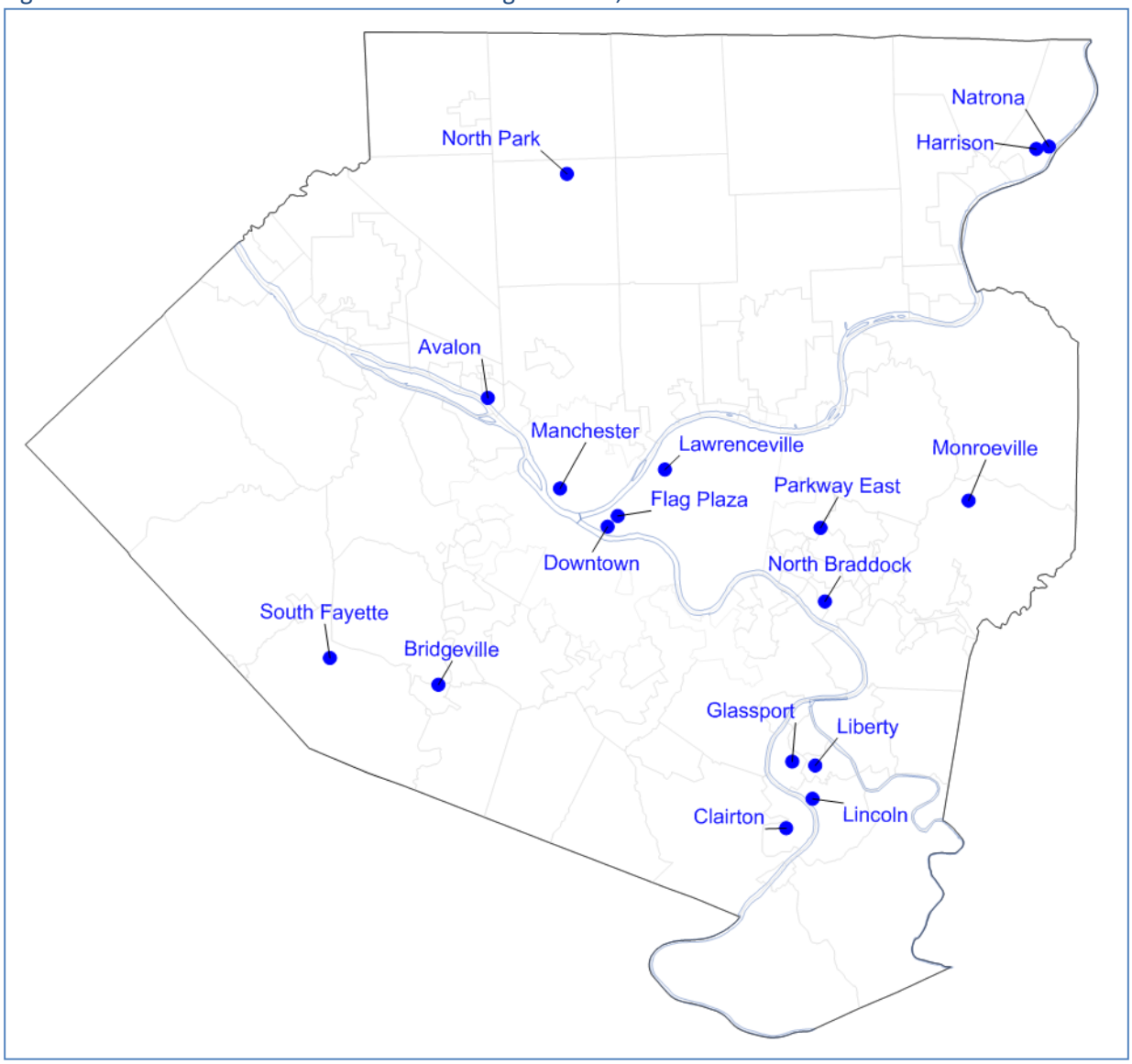
1. Introduction

This Five-Year Network Assessment is a requirement of 40 CFR Part 58.10.d and it serves to describe the Allegheny County Health Department's air monitoring network's mission for the next five years. The ACHD's Air Quality Program completed its first Five-Year Network Assessment in July 2010. The purpose of the Five-Year Assessment is to plan for the future of the network. It intends to analyze the effectiveness and efficiency of the network and to determine if the network is best serving the population using available resources. The recommendations of this assessment are not binding. Any changes to the network will be addressed in the Annual Network Review. This assessment includes the six National Ambient Air Quality Standards (NAAQS) along with air toxics and meteorological instruments. 40 CFR Part 58.10.d is below:

> *"The State, or where applicable **local,** agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and where new technologies are appropriate for incorporation in the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan to the Regional Administrator. The first assessment is due July 1, 2010."*

This assessment uses Allegheny County as the domain, as well as the Core Based Statistical Area (CBSA) of Pittsburgh, PA. This larger domain includes monitoring sites outside of Allegheny County that are operated by the Pennsylvania Department of Environmental Protection (PA DEP). PA DEP sites are utilized to show areas served but are not analyzed in depth as PA DEP has prepared its own network assessment.

Figure 1-1. ACHD Criteria Pollutant Monitoring Network, 2014



Note: map excludes sites with non-criteria pollutants only, such as dustfall and hydrogen sulfide.

2. Tools and Methodology

2.1. Assessment Data

Data for the assessment analysis was compiled by ACHD from in-house databases and various public sources. Time periods and locations of downloadable data are summarized in Table 2-1 below.

Table 2-1. Data Used in the Assessment

Information Gathered	Time Period	Web Site Location of Data (if available)
Design Values	2010 to 2014	http://www.epa.gov/airtrends/values.html
Nonattainment Areas	Active	http://www.epa.gov/airquality/greenbook/index.html
Population	2010-2013	http://factfinder.census.gov
Pollutant Trends	1988 to 2013	http://www.epa.gov/airtrends/
Analysis Tools: - Population Animation - Area Served - Correlation Matrix - Removal Bias - New Sites Tool	2009 to 2013	https://ebailey78.shinyapps.io/NetAssessApp/ (open in Google Chrome for best results)
Meteorological Data	2010 to 2014	For airport data, National Weather Service: http://www.nws.noaa.gov/ Also, National Climatic Data Center: http://www.ncdc.noaa.gov/oa/ncdc.html Note: Wind roses were generated from in-house ACHD met data.
Air Quality Monitored Data	Recent Years	http://www.epa.gov/airdata/
Air Quality Index	Current	http://www.airnow.gov/
Emission Inventories	Recent Years	http://www.epa.gov/ttn/chief/eiinformation.html
Traffic Counts	Recent Years	State Transportation Department or Other

2.2. Assessment Tools

For the 2010 Five-Year Network Assessment, EPA had created a set of programs that provided tools that described Area Served, Correlation Matrices, Removal Bias, and New Sites. EPA did not update these tools for 2015 Assessment; the Lake Michigan Air Directors Consortium (LADCO) updated these tools in a program called NetAssess. (Note: not all tools are available for all parameters.)

- Area Served – This tool creates Thiessen Polygons to show the area represented by the monitoring site. The distance from each site to its neighbor changes the size and shape of the polygon. All points within the polygon are closer to the monitor in that polygon than to any other monitor. Once the polygons were created, LADCO's tool pulls 2010 census data that can be additionally displayed. The population is broken down by age and sex. Area served statistics were generated using the default NetAssess settings and can extend beyond the boundaries of the county (depending on surrounding sites).

- Correlation Matrices – This tool creates a graphic that shows correlation, relative difference, and distance. It is assumed that the larger the distance between the monitors the lower the correlation for most parameters, but for a pollutant like ozone, monitors in the domain can be very highly correlated. Monitors close to sources of pollution can have high relative differences compared to other sites in the domain.

- Removal Bias – The removal bias tool studies the bias to determine if sites are redundant.
    - "The bias estimation uses the nearest neighbors to each site to estimate the concentration at the location of the site if the site had never existed. This is done using the Voronoi Neighborhood Averaging algorithm with inverse distance squared weighting. The squared distance allows for higher weighting on concentrations at sites located closer to the site being examined. The bias was calculated for each day at each site by taking the difference between the predicted value from the interpolation and the measured concentration. A positive average bias would mean that if the site being examined was removed, the neighboring sites would indicate that the estimated concentration would be larger than the measured concentration. Likewise, a negative average bias would suggest that the estimated concentration at the location of the site is smaller than the actual measured concentration.[1]"

- Exceedance Probabilities – The maps created provide information about the spatial distribution of the highest daily values for a pollutant. If a monitor has measured high values, the probability map shows additional areas where high values may be observed. These maps were created using EPA/CDC downscaler data.[2]

[1] http://ladco.github.io/NetAssessApp/tools.html#removebias
[2] http://www.epa.gov/nerlesd1/land-sci/lcb/lcb_faqsd.html

2.3. Ranking Methodology

Table 2-2 below shows the criteria used for scoring and ranking each monitor site by pollutant. The ranking methodology was devised to compare sites to one another on a normalized basis. Factors for each site were based on ranges from 0 to 1, with the exception of monitored data. Monitored data scoring was based on the NAAQS, allowing for added emphasis on sites with higher concentrations.

Table 2-2. Ranking Criteria Used for Site Scoring/Ranking

RANKING CRITERIA

Number of Other Pollutants Measured at Site (criteria only)

Pollutants	Score
0	0.00
1	0.25
2	0.50
3	0.75
4+	1.00

Number of Years in Operation

Number of Years	Score
0-5	0.00
6-10	0.25
11-20	0.50
21-30	0.75
31+	1.00

Monitored Data/Design Values (DVs) (based on most recent time period)

PM_{10}	24-hour max divided by 75
$PM_{2.5}$	Annual DV divided by 6; 24-hour DV divided by 17.5
Ozone	8-hour DV multiplied by 14
SO_2	1-Hour DV divided by 37.5
NO_2	Annual DV divided by 26.5; 1-Hour DV divided by 50
CO	8-hour max divided by 4.5; 1-hour max divided by 17.5
Lead	3-month DV multiplied by 7

Nonattainment Area (NAA) or Maintenance Area (MA)

Located in a nonattainment area = score of 1, else 0
Located in a maintenance area = score of 0.5, else 0

Site Objective(s)

Meets objective(s) = score of 1, else 0

Population Served Density (population/square mile of area served)

Pop./mi²	Score
0-500	0.00
501-1000	0.25
1001-2000	0.50
2001-3000	0.75
3001+	1.00

Closest Site (same pollutant)

Distance (km)	Score
0-5	0.00
6-10	0.25
11-15	0.50
16-20	0.75
21+	1.00

3. Standards and Objectives

3.1. Standards

Table 3-1 below shows the current National Ambient Air Quality Standards (NAAQS) at the time of this assessment.

Table 3-1. Current NAAQS

Pollutant	Primary Standard		Secondary Standard	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm	8- hour[1]	None	
	35 ppm	1-hour[1]		
Lead	0.15 µg/m³	Rolling 3-month average[2]	Same as Primary	
Nitrogen Dioxide	100 ppb	1-hour[3]	None	
	53 ppb	Annual[4]	Same as Primary	
Ozone	0.075 ppm	8-hour[5]	Same as Primary	
Particulate Matter (PM_{10})	150 µg/m³	24-Hour[6]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	12 µg/m³	Annual[7]	15 µg/m³	Annual[7]
	35 µg/m³	24-Hour[8]	Same as Primary	
Sulfur Dioxide	75 ppb	1-hour[9]	0.5 ppm	3-hour[10]

[1] Not to be exceeded more than once per year
[2] Not to be exceeded
[3] 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[4] Annual Mean
[5] Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
[6] Not to be exceeded more than once per year on average over 3 years.
[7] Annual mean, averaged over 3 years
[8] 98th percentile, averaged over 3 years
[9] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[10] Not to be exceeded more than once per year

Where possible, assessment results were examined for appropriateness to new proposed standards. The levels of proposed NAAQS and status of review for each standard at the time of this assessment are given in Table 3-2 below.

Table 3-2. Proposed NAAQS

Pollutant	Current NAAQS Level	Status of Current NAAQS Review	Proposed Changes	Expected Date of Final Decision
Ozone	0.75 ppb (8-hour)	Primary and secondary NAAQS review	Proposed rule between 0.065 and 0.070 ppm	October 2015
SO_2	75 ppb (1-hour) 0.5 ppm (3-hour)	Final Rule signed 2012. Nonattainment designations complete 2013		
NO_2	100 ppb (1 hour) 53 ppb (annual)	Monitoring Requirements rule signed in 2013		
$PM_{2.5}$	12 µg/m^3 (annual) 35 µg/m^3 (24-hour)	$PM_{2.5}$ proposed SIP requirements rule March 2015		
PM_{10}	150 µg/m^3 (24-hour)			
Pb	0.15 µg/m^3 (rolling 3-month)	Retain current level	None	2014

3.2. Designations

Allegheny County is part of or contains nonattainment areas for ozone, $PM_{2.5}$, and sulfur dioxide.

Table 3-3. Allegheny County Nonattainment Areas

Year	Pollutant	Area Name
1997	Ozone	Pittsburgh-Beaver Valley, PA - (Moderate) (1)
2008	Ozone	Pittsburgh-Beaver Valley, PA - (Marginal) (1)
1997	$PM_{2.5}$	Liberty-Clairton, PA - (Moderate) (2)
1997	$PM_{2.5}$	Pittsburgh-Beaver Valley, PA - (Moderate) (1)
2006	$PM_{2.5}$	Liberty-Clairton, PA - (Moderate) (2)
2006	$PM_{2.5}$	Pittsburgh-Beaver Valley, PA - (Moderate) (1)
2010	Sulfur Dioxide	Allegheny, PA(2)

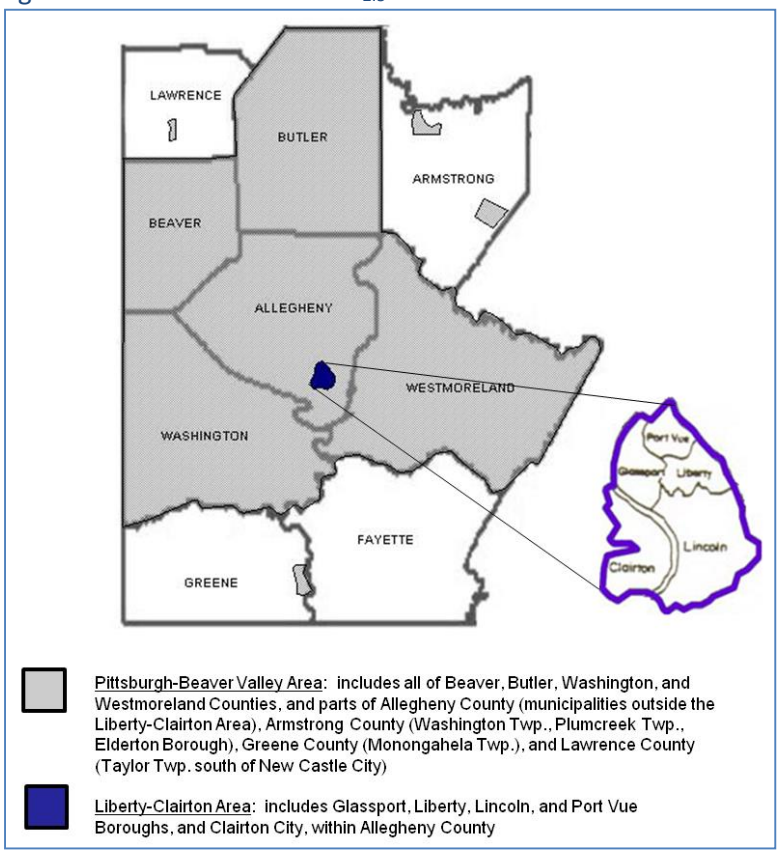
(1) Part of a multi-county nonattainment area
(2) Partial county nonattainment area

Figures 3-1 through 3-3 display the currently designated nonattainment areas within or including Allegheny County.

Figure 3-1. Ozone (8-Hour) 1997 and 2008 Nonattainment Area

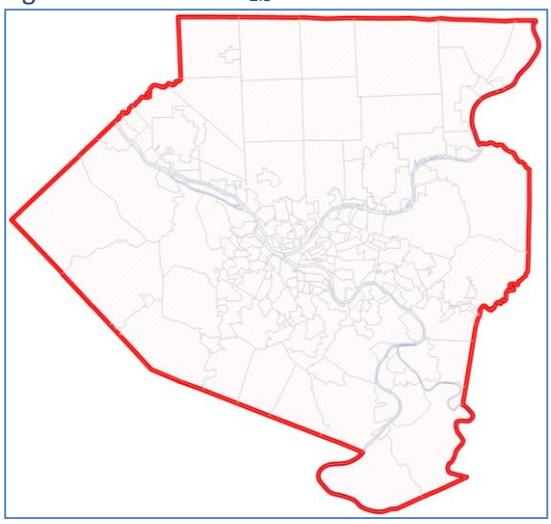
This area is known as the Pittsburgh-Beaver Valley area and is the same for both the 1997 and 2008 standards.

Figure 3-2. 1997 and 2006 $PM_{2.5}$ Nonattainment Areas



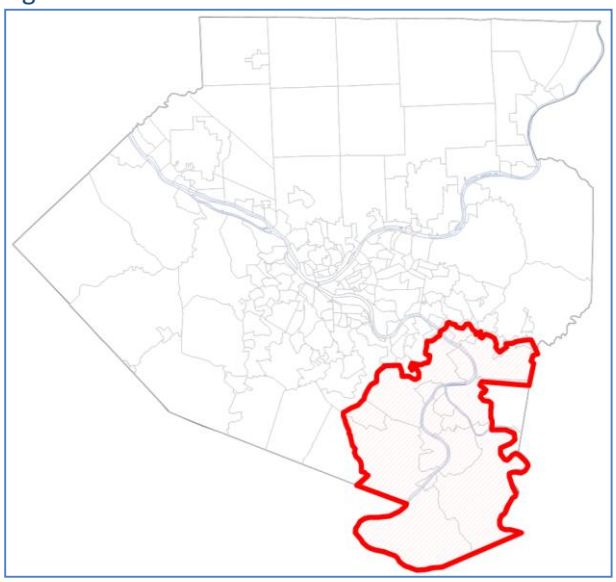
PA DEP is responsible for State Implementation Plans for larger areas such as the Pittsburgh-Beaver Valley ozone nonattainment areas, and ACHD assists PA DEP with their needs regarding Allegheny County. ACHD is responsible for in county smaller areas such as the Liberty-Clairton area.

Figure 3-3. 2012 $PM_{2.5}$ Nonattainment Area



This $PM_{2.5}$ area is known as the Allegheny County nonattainment area, comprising all of Allegheny County. Previously, the Liberty-Clairton area had been a separate area for PM.

Figure 3-4. 2010 Sulfur Dioxide Nonattainment Area



This SO_2 area is known as the Allegheny, PA nonattainment area and comprises most of the Allegheny County portion of the Monongahela River valley basin. It is made up several municipalities in the Monongahela Valley, with current monitors at Liberty and North Braddock. Previous monitors included the Glassport and Clairton sites (both discontinued).

3.3. Monitoring Objectives

Current monitor objectives and requirements according to 40 CFR Part 58 Appendix D are summarized below in Table 3-3 for each pollutant.

Table 3-3. Monitoring Objectives

Pollutant	Requirement(s)	Provisions for Locating a Site
Ozone	Appendix D, Section 4.2 - "…at least one O_3 site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that particular area. More than one maximum concentration site may be necessary for some areas."	Appendix D, Section 4.1 - The "…maximum concentration monitor site should be selected in a direction from the city that is most likely to observe the highest O_3 concentrations, more specifically, downwind during periods of photochemical activity. In many cases these, these maximum concentration sites will be located 10 to 30 miles or more downwind from the urban areas where maximum O_3 precursor emissions originate."
CO	Appendix D, Section 4.2 - "one CO monitor is required to operate collocated with one required near-road NO_2 monitor…." "…Regional Administrators may require additional CO monitoring including but not limited to situations characterizing concentrations due to stationary sources, and characterizing downtown areas and urban canyons."	Appendix D, Section 4.2 - "Microscale measurements typically represent areas in close proximity to major roadways, within street canyons, over sidewalks, and in some cases, point and area sources. Emissions on roadways result in high ground level CO concentrations at the microscale, where concentration gradients generally exhibit a marked decrease with increasing downwind distance from major roads, or within downtown areas including urban street canyons. Emissions from stationary point and area sources, and non-road sources may, under certain plume conditions, result in high ground level concentrations at the microscale.."
SO_2	Appendix D, Section 4.4 - "For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO_2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO_2 monitor is required within that CBSA."	Appendix D, Section 4.4 - "(1) The SO_2 monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of this appendix): population exposure, highest concentration, source impacts, general background, or regional transport. SO_2 monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors under this part."
NO_2	Appendix D, Section 4.3.2 - "(a) Within the NO_2 network, there must be one microscale near-road NO_2 monitoring station in each CBSA with a population of 500,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high AADT counts…." (AADT means the annual average daily traffic.) Section 4.3.3 - "(a) Within the NO_2 network, there must be one monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO_2 concentrations representing the neighborhood or larger spatial scales."	Appendix D, Section 4.3.2.a - "(1) The near-road NO_2 monitoring stations shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO_2 concentrations are expected to occur and siting criteria can be met in accordance with appendix E of this part…."

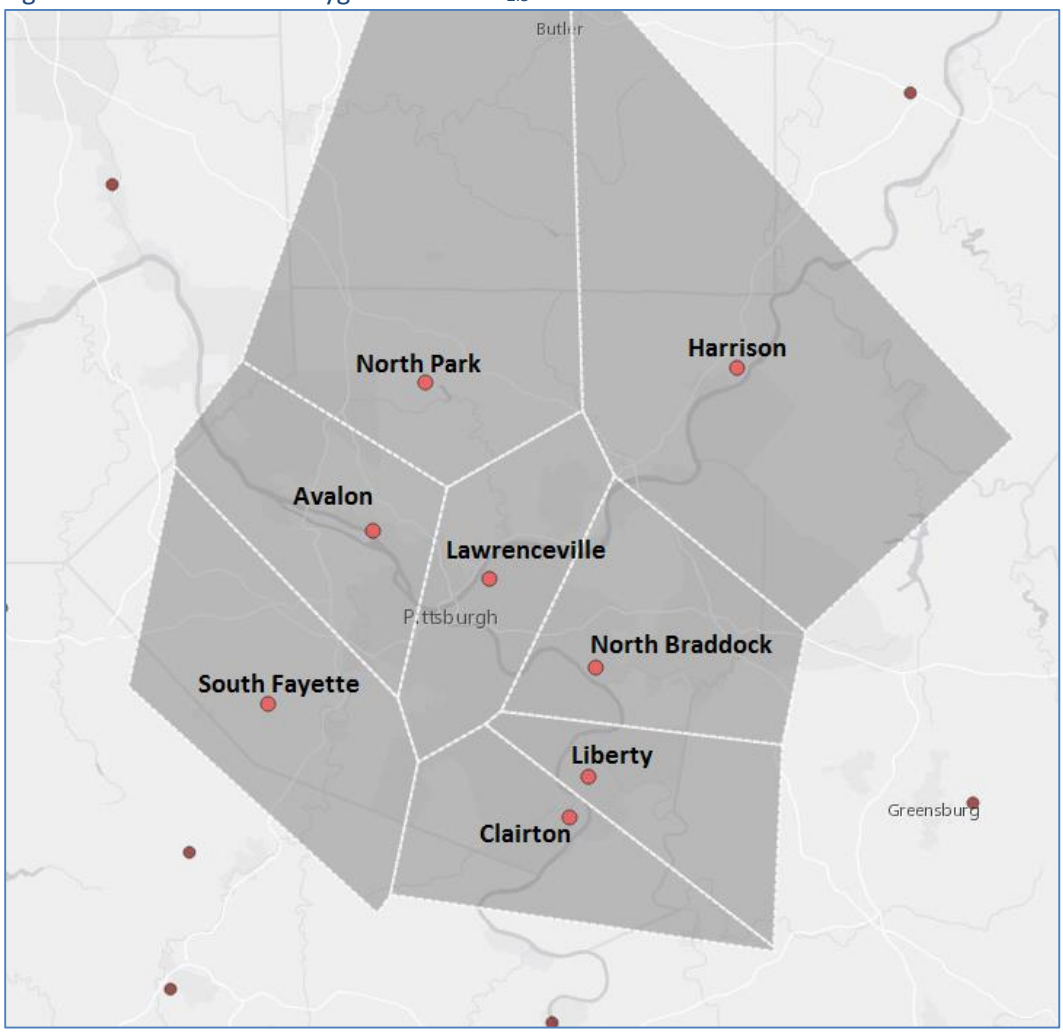
Pollutant	Requirement(s)	Provisions for Locating a Site
$PM_{2.5}$	Appendix D, Section 4.7 - Table D-5 provides Minimum Monitoring Requirements.	Appendix D, Section 4.7 (b) – " The required monitoring stations or sites must be sited to represent area-wide air "These monitoring stations will typically be at neighborhood or urban–scale; however, …" (1) At least one monitoring station is to be sited in a population-oriented area of expected maximum concentration." (2) For areas with more than one required SLAMS, a monitoring station is to be sited in an area of poor air quality" (c) "The most important spatial scale to effectively characterize the emissions of particulate matter from both mobile and stationary sources is the neighborhood scale for $PM_{2.5}$."
PM_{10}	Appendix D, Section 4.6 - Table D-4 provides Minimum Monitoring Requirements.	Appendix D, Section 4.6 - "(b) although microscale monitoring may be appropriate in some circumstances, the most important spatial scale to effectively characterize the emissions of PM_{10} from both mobile and stationary sources are the middle scales and neighborhood scales."
Pb	Appendix D, Section 4.5 - "(a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure…." (b) State and, where appropriate, local agencies are required to conduct non-source-oriented Pb monitoring at each NCore site required under paragraph 3 of this appendix in a CBSA with a population of 500,000 or more	Appendix D, Section 4.5 - "…there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year"

4. $PM_{2.5}$ Analysis

4.1. Area Served

The area served polygons for $PM_{2.5}$ Federal Reference Method (FRM) monitors are displayed in Figure 4.1 below. Table 4.1 shows a breakdown of the population and area served in square miles. There are currently no FEM monitors deployed as official $PM_{2.5}$ monitors in the county. Testing to date has shown non-equivalence for some FEM methods at County locations.

Figure 4-1. Area Served Polygons 2014 $PM_{2.5}$ Network



Note: sites not labeled are operated by PA DEP

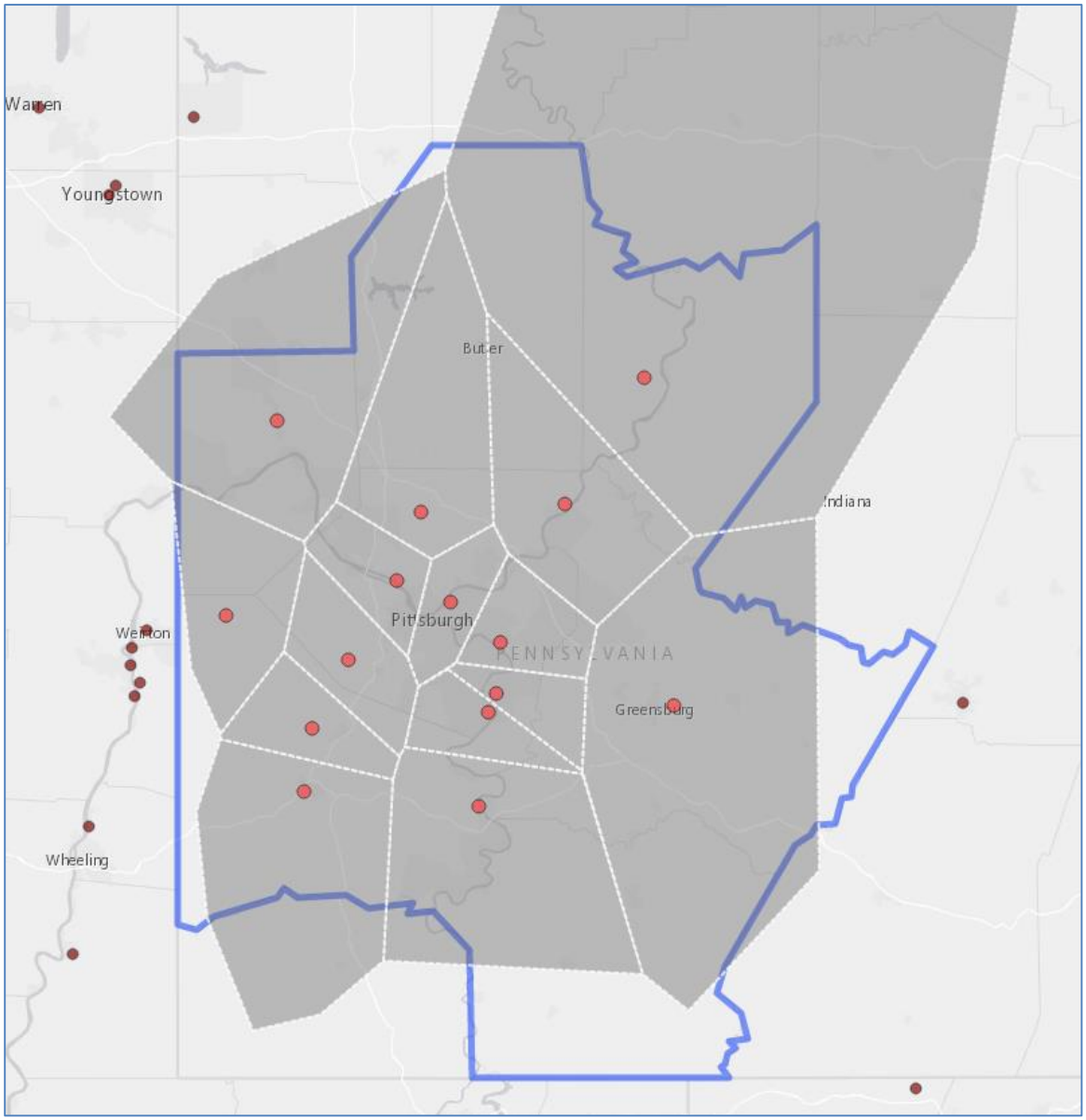
Table 4-1. $PM_{2.5}$ Area Served Demographics for Allegheny County Monitors

AQS Site ID	Site Name	Total Population	Area-Miles²
42-003-0002	Avalon	195,086	111
42-003-0008	Lawrenceville	370,128	96
42-003-0064	Liberty	94,168	80
42-003-0067	South Fayette	162,957	154
42-003-0093	North Park	206,310	376
42-003-1008	Harrison	181,459	360
42-003-1301	North Braddock	240,873	118
42-003-3007	Clairton	77,919	98

The Lawrenceville site serves the largest population but is the second to smallest in total area. This site includes the City of Pittsburgh and is representative of urban conditions. These demographics are skewed younger and ethnically diverse. The other smallest areas served are the Liberty and Clairton sites. These sites along with North Braddock provide surveillance in the heavily industrialized Monongahela valley. The North Braddock, Avalon, and Harrison sites serve areas with a mix of urban and suburban populations that also contain industrial areas. South Fayette and North Park serve suburban populations without close industrial areas. These sites also represent background concentrations.

The Pittsburgh Core Based Statistical Area (CBSA) is highlighted by the blue polygon in Figure 4-2 below. Between ACHD and PA DEP sites, there is a dense $PM_{2.5}$ network in southwestern Pennsylvania. All markers in Allegheny County are FRM monitors while PA DEP sites are a mix of FRM and FEM monitors.

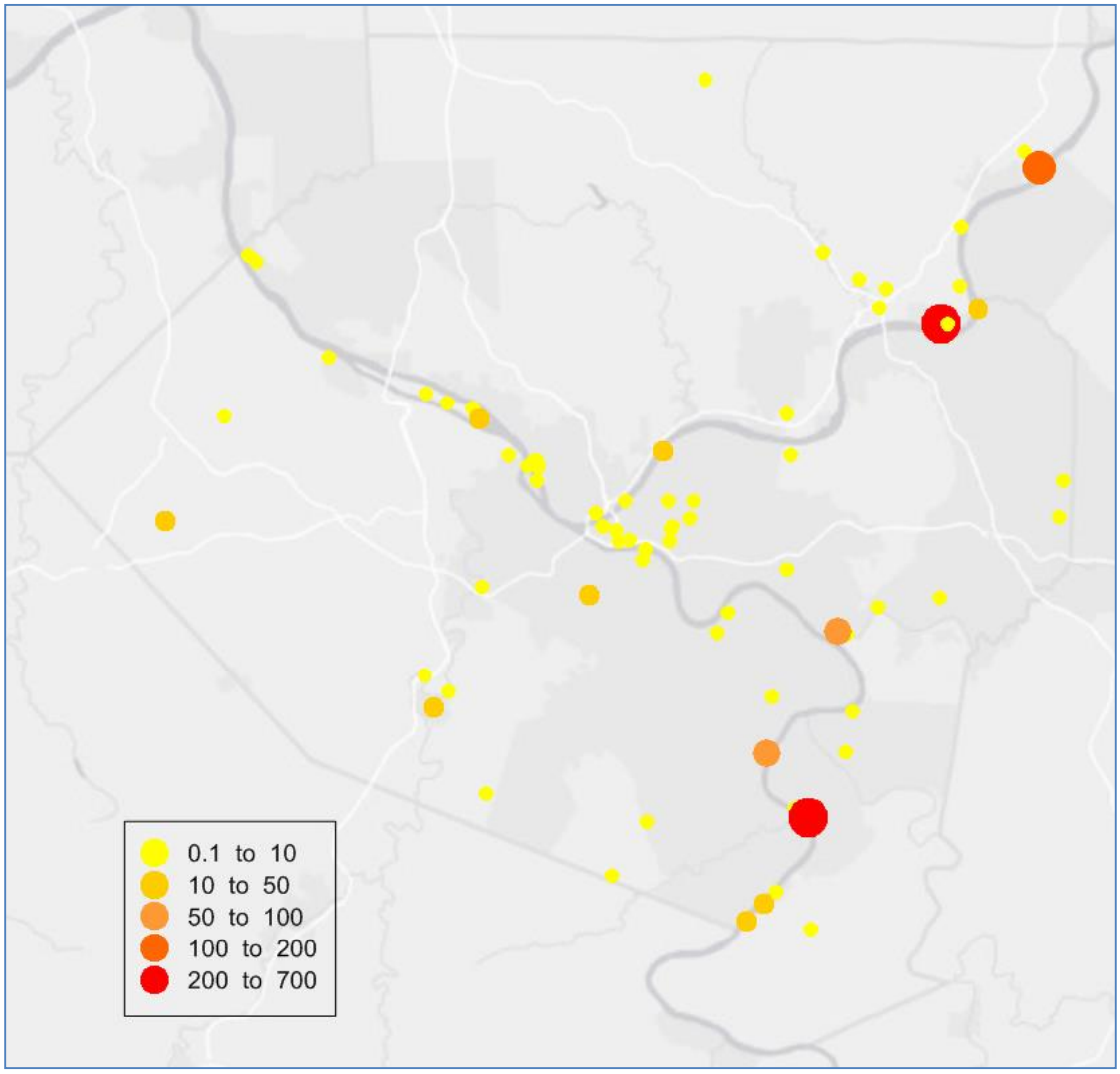
Figure 4-2. Area Served Polygons for $PM_{2.5}$ Southwestern Pennsylvania



4.2. Emissions

Figure 4-3 shows point source direct $PM_{2.5}$ emissions for Allegheny County sources, based on the 2012 emissions inventory.

Figure 4-3. Direct $PM_{2.5}$ Point Source Emissions, 2012 (tons actual)

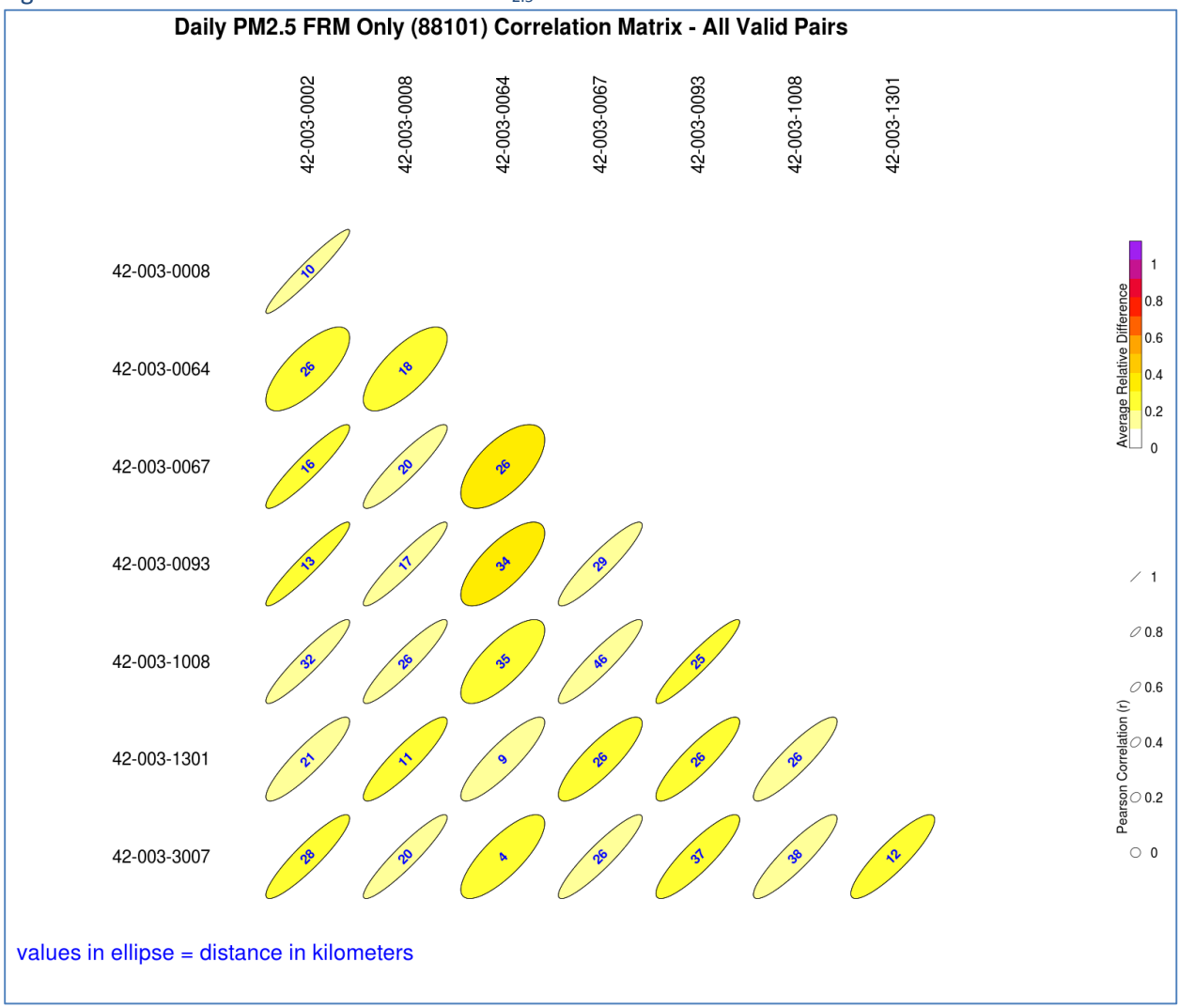


While there are several wide-spread small sources of directly-emitted $PM_{2.5}$, the largest sources are from industrial facilities in the river valleys. For planning and modeling purposes, $PM_{2.5}$ precursors are also considered in the transformation of $PM_{2.5}$ from both near-field and long-range sources. (See Section 14. Emissions Inventory for more discussion of sources.)

4.3. Correlation Matrices

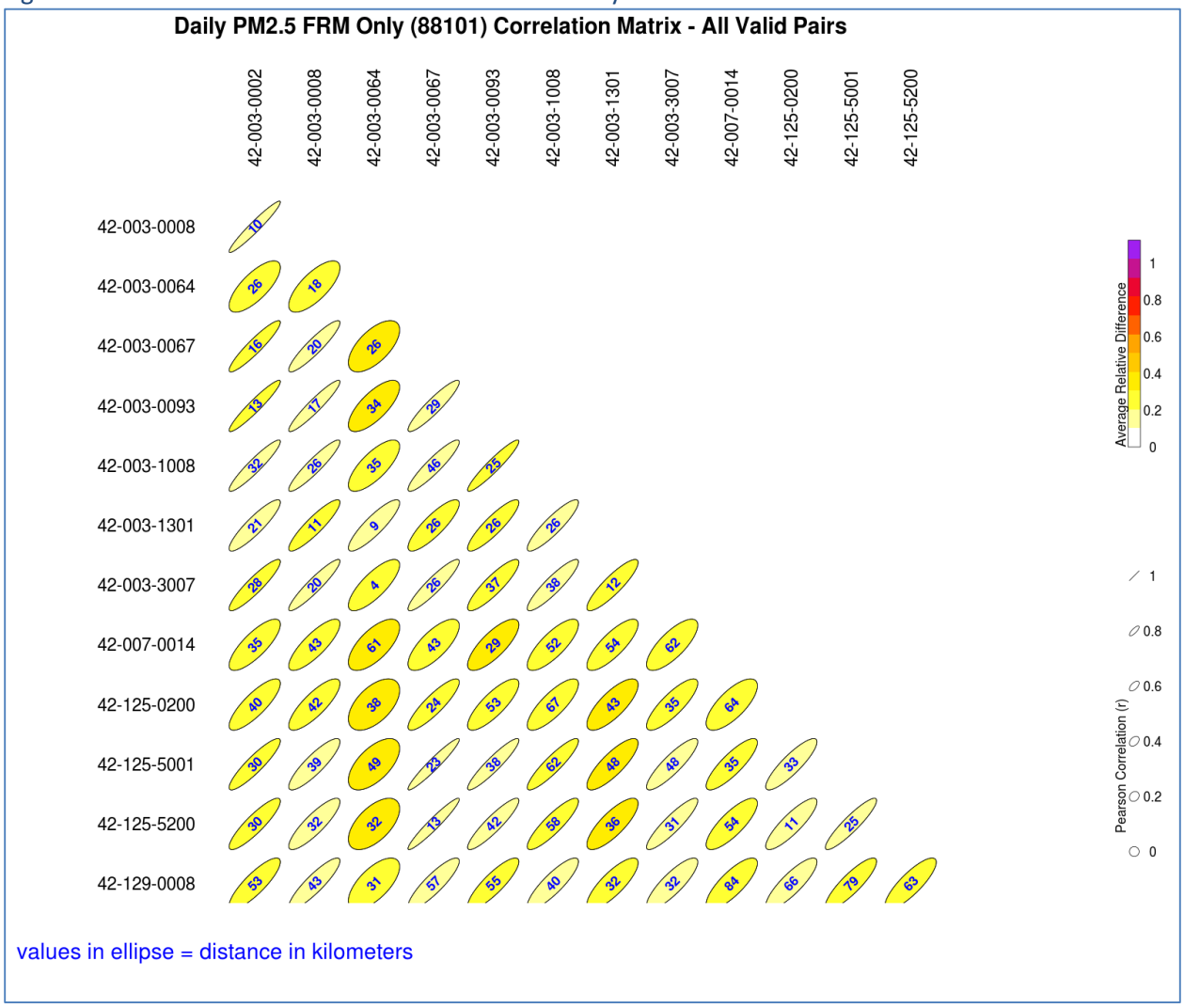
The correlation matrix for Allegheny County sites is displayed in Figure 4-4. This figure was created using 2011 through 2013 using only the FRM data set. The correlation matrix for southwestern Pennsylvania is Figure 4-5 on the following page.

Figure 4-4. Correlation Matrix for ACHD's $PM_{2.5}$ Network



South Fayette (42-003-0067) and Liberty (42-003-0064) have the least correlation, which is expected. South Fayette is considered a background monitor and Liberty is affected by industrial sources. The greatest correlation is between Lawrenceville (42-003-0008) and Avalon (42-003-0002). Liberty does not correlate well with other sites. It justifies that Liberty is an important site. Conditions at the Liberty monitor are not representative of other areas in the county. Although Liberty is only four kilometers away from Clairton (42-003-3007), they do not correlate well to each other, but are both important to characterize conditions in the Liberty-Clairton Nonattainment Area. Avalon(42-003-0002), Lawrenceville and North Braddock(42-003-1301) show similar correlations across the network. This seems it would indicate redundancy but, these monitors carry more value than just their concentrations.

Figure 4-5. Correlation Matrix for Southwestern Pennsylvania

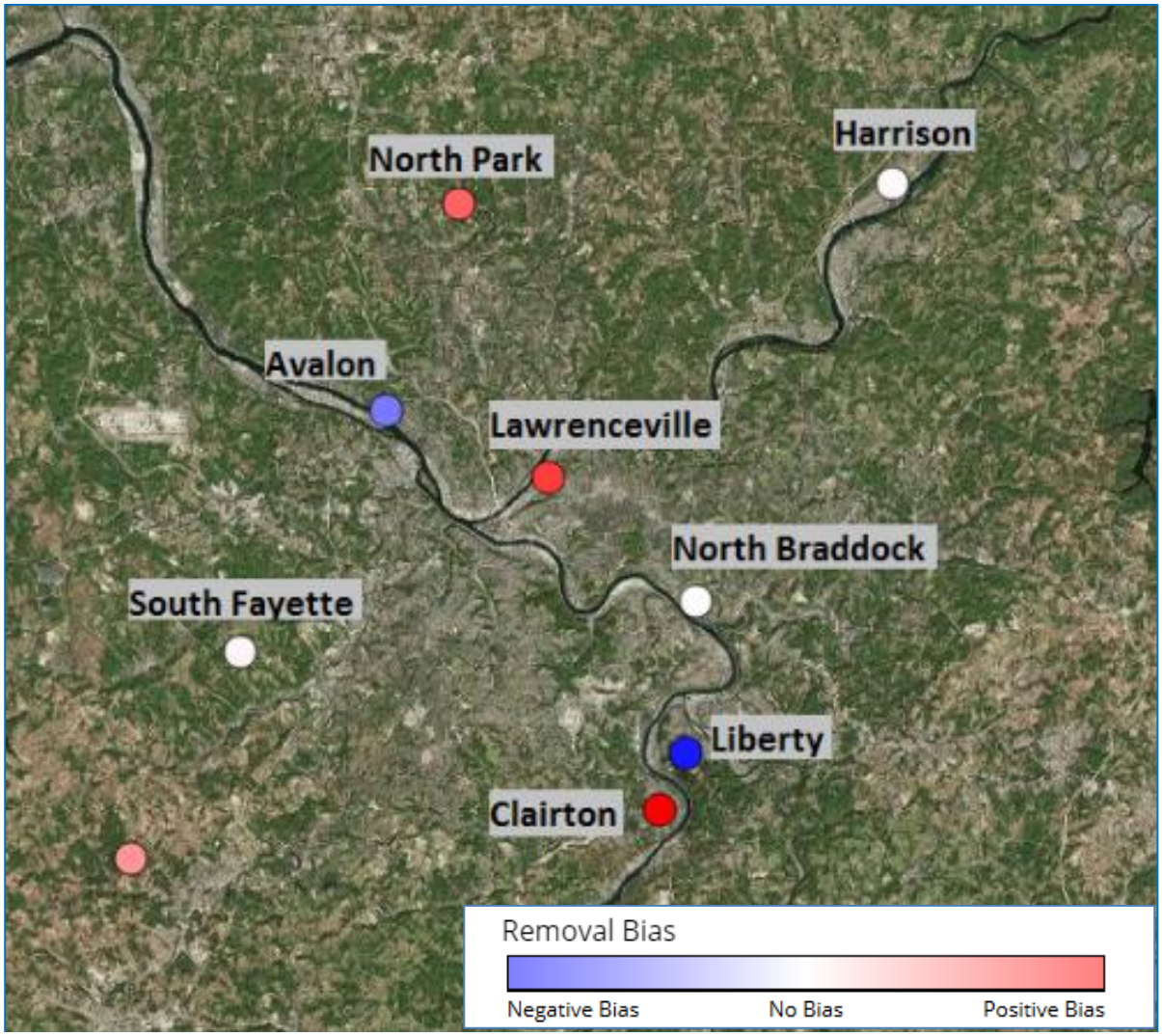


Liberty (42-003-0064) shows the least correlation with all sites across southwestern Pennsylvania. The South Fayette (42-003-0067) and North Park (42-003-0093) correlate well with PA DEP's Hillman State Park Site (42-125-5001), which supports the value of South Fayette and North Park as background sites.

4.4. Removal Bias

Figure 4-6 shows the results of the removal bias tool for the years of 2011 to 2013. Allegheny County sites are labeled, other sites are PA DEP sites.

Figure 4-6. Removal Bias for $PM_{2.5}$ FRMs 2011-2013



The white no bias dots for Harrison, North Braddock, and South Fayette indicate that they are not skewed to the positive or negative compared to the sites next to them. Although North Braddock has the second highest annual average concentration for the past three years, it is compared to the negative bias of Liberty and positive bias of Lawrenceville. These show that this is place that should continue to be monitored. These three sites have greater value than just their concentrations. South Fayette is an indicator of incoming air quality into the county. It is also being closely monitored to ascertain if natural gas activity monitoring outside the county have any effect on air entering the county from the Southwest. Harrison shares a doppelganger responsibility compared to South Fayette. It monitors air exiting the county but also provide surveillance in the Allegheny River valleys and its industrial sources.

The positive bias of North Park, Lawrenceville and Clairton are based on their low concentrations with Clairton identified as having the most positive bias. None of these sites would be a candidate for removal. North Park has been established as a background site with coverage of the northwestern part of the county. Lawrenceville is an NCore site with historical significance and urban surveillance and is required to operate both a continuous and filter based $PM_{2.5}$ monitor.

The Avalon monitor's negative bias ascribes value to it higher concentrations. The Avalon monitor is the third highest monitor in the county. Its surveillance of the industrial area of Neville Island further supports continuing to operate this monitor.

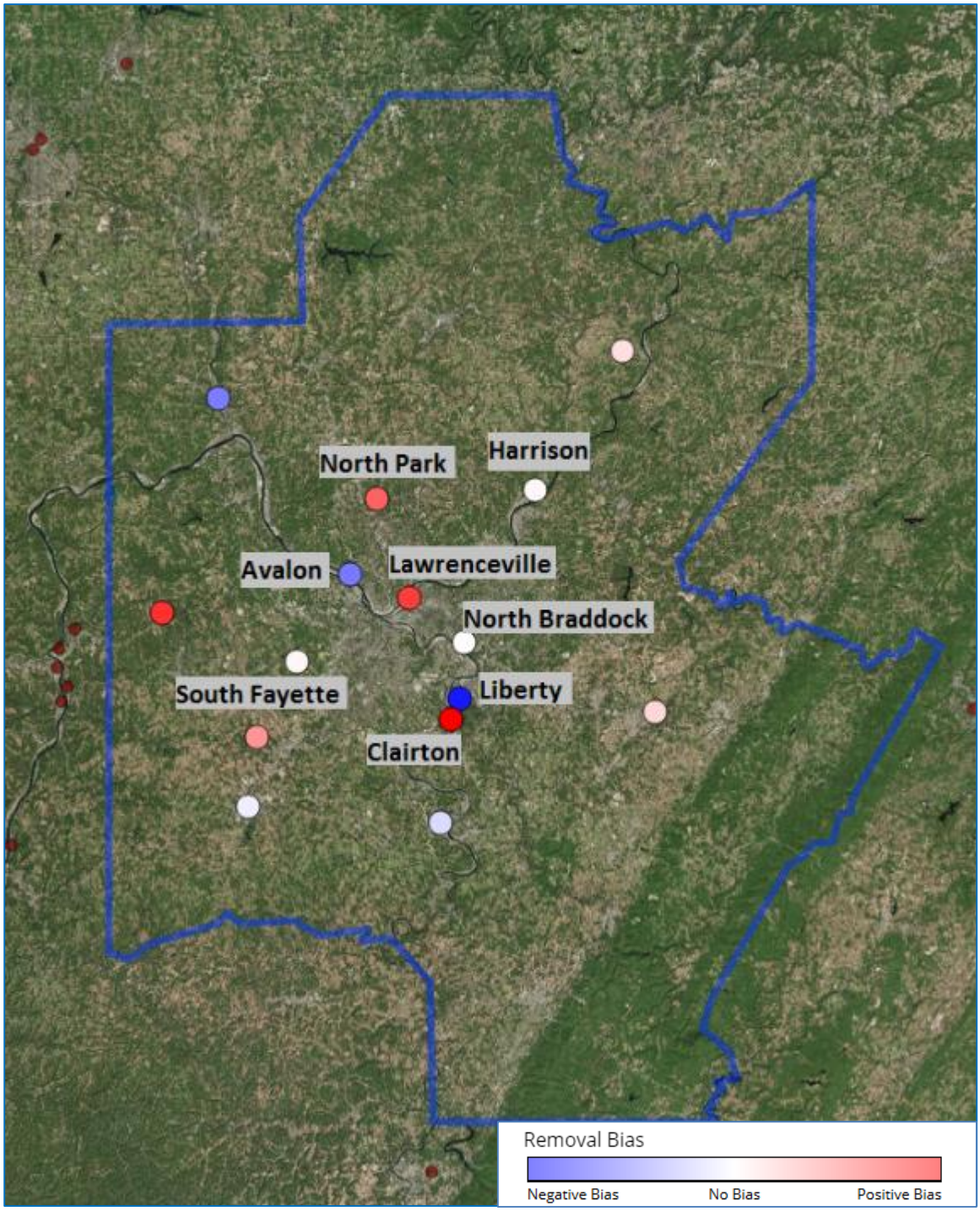
Because of their close proximity and relative difference in concentration, Liberty and Clairton have great value in surveillance in the Liberty Clairton nonattainment area.

Table 4-2. Site Removal Statistics for ACHD's $PM_{2.5}$ Network

AQS Site ID	Site Name	Mean Removal Bias	Min Removal Bias	Max Removal Bias	Removal Bias Standard Deviation	Neighbors Included
42-003-0002	Avalon	-1.5594	-9.34	2.49	1.55	5
42-003-0008	Lawrenceville	2.2742	-5.89	43.4	4.97	7
42-003-0064	Liberty	-2.6906	-43.2	7.29	5.86	4
42-003-0067	South Fayette	0.1101	-5.39	6.88	1.64	6
42-003-0093	North Park	1.8268	-2.29	6.28	1.50	5
42-003-1008	Harrison	0.078	-8.82	7.39	1.73	5
42-003-1301	North Braddock	-0.0175	-10.2	16.2	2.43	4
42-003-3007	Clairton	2.9711	-8.06	25.4	4.98	5

Figure 4-7 displays the removal bias results for southwestern Pennsylvania. With the Pittsburgh- Beaver Valley and Liberty Clairton $PM_{2.5}$ nonattainment areas, ACHD and PA DEP would likely keep a robust network of $PM_{2.5}$ monitors for the next five years and into the future.

Figure 4-7. Removal Bias for $PM_{2.5}$ for Southwestern Pennsylvania



4.5. New Sites and Technology

As part of the near-road monitoring regulations, ACHD is required to install a $PM_{2.5}$ at the recently established Parkway East Near-Road monitoring station in Wilkinsburg. ACHD plans to discontinue PM_{10} monitoring at the Monroeville site and reallocate resources to the Near-Road site. Figure 4-8 shows the location of the new monitoring site, identified by the labeled green mark. The other green dot in the downtown Pittsburgh area marks the current CO and PM_{10} monitoring site Flag Plaza. This site would be a strong candidate for a continuous $PM_{2.5}$ monitor. More people are moving to and living in the downtown area and there is no fine particulate monitor to serve this unique area. Additionally concentrations downtown may be different than the urban site of Lawrenceville. Figure 4-9 on the following page displays the $PM_{2.5}$ sites on a roadway map to show the highway and location of the Near-Road site.

Figure 4-8. Current $PM_{2.5}$ Network with Future Planned and Potential Sites

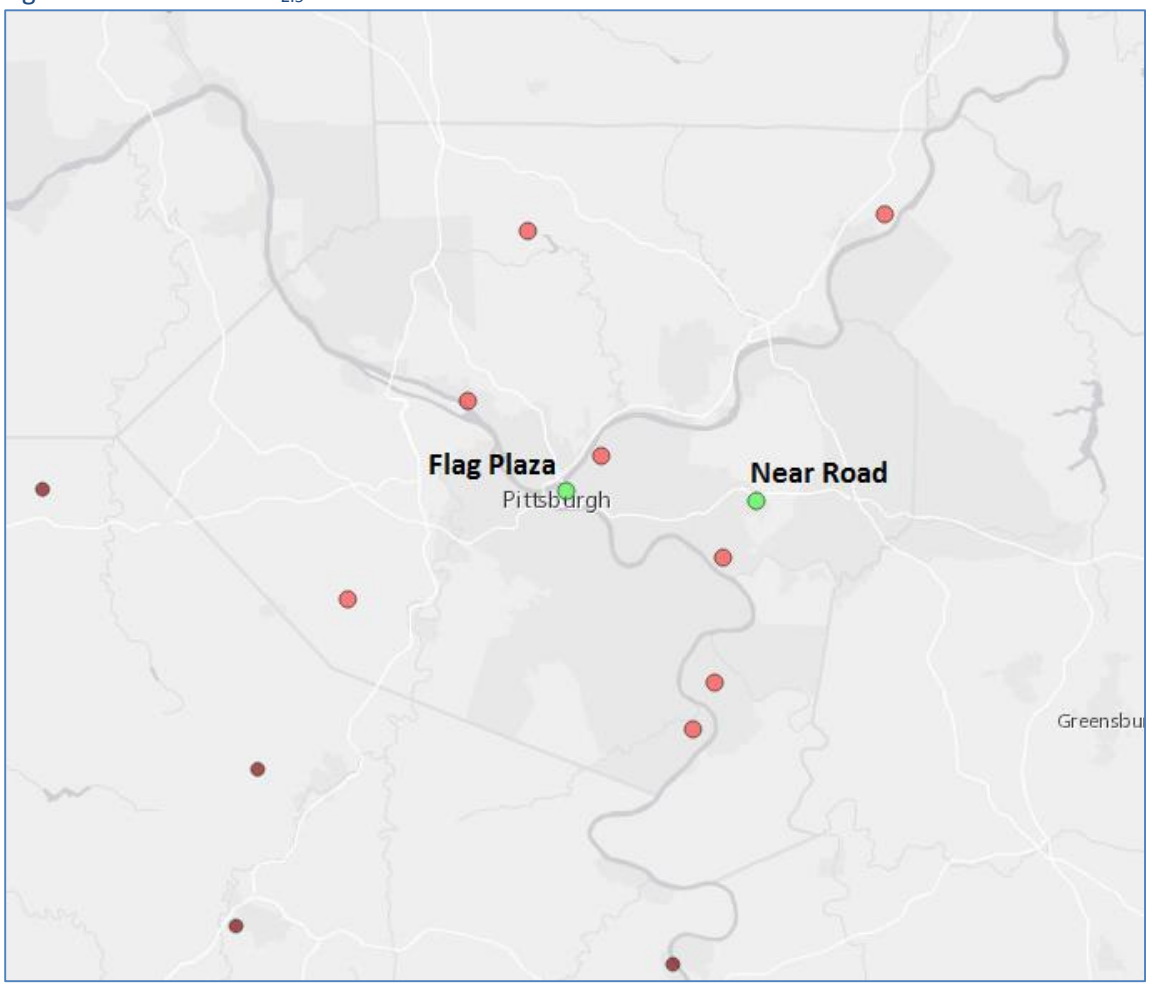
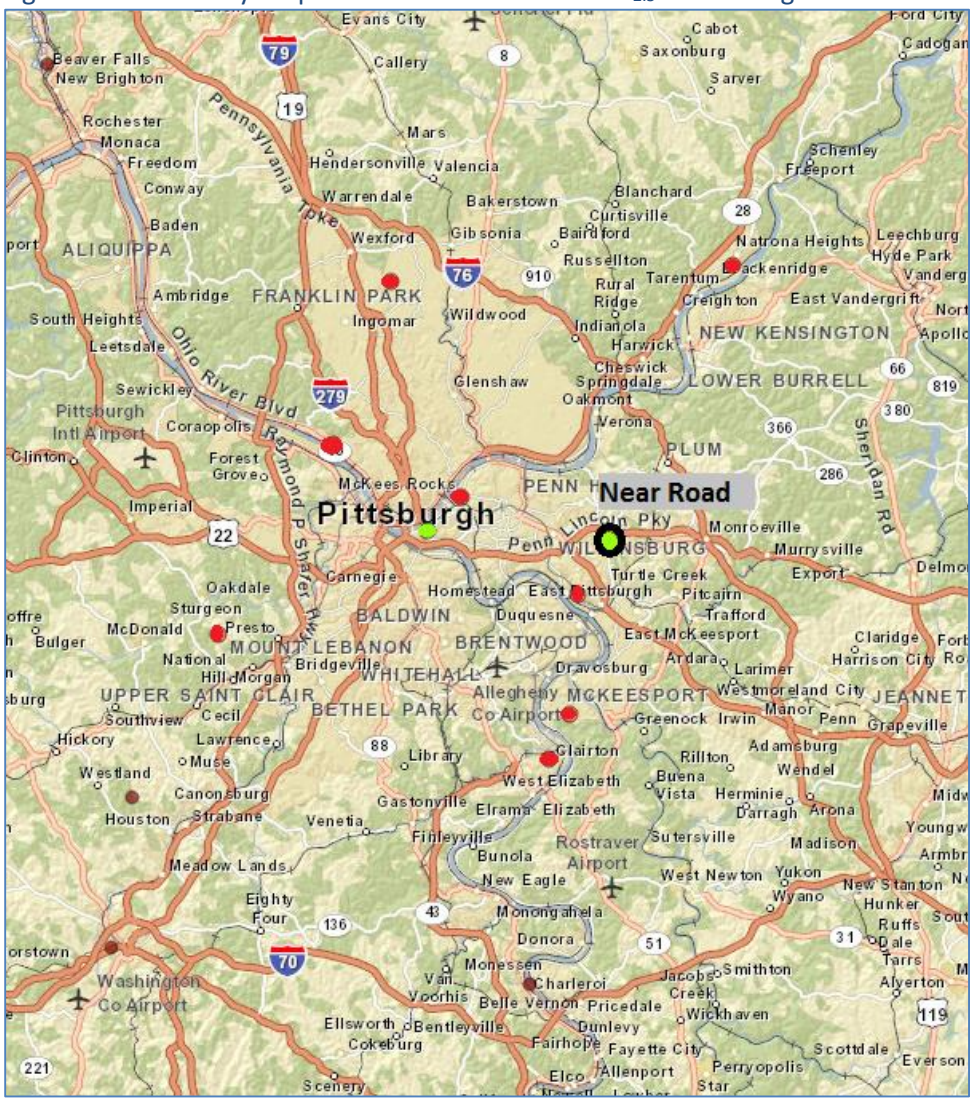


Figure 4-9. Roadway Map of the New Near-Road $PM_{2.5}$ Monitoring Site

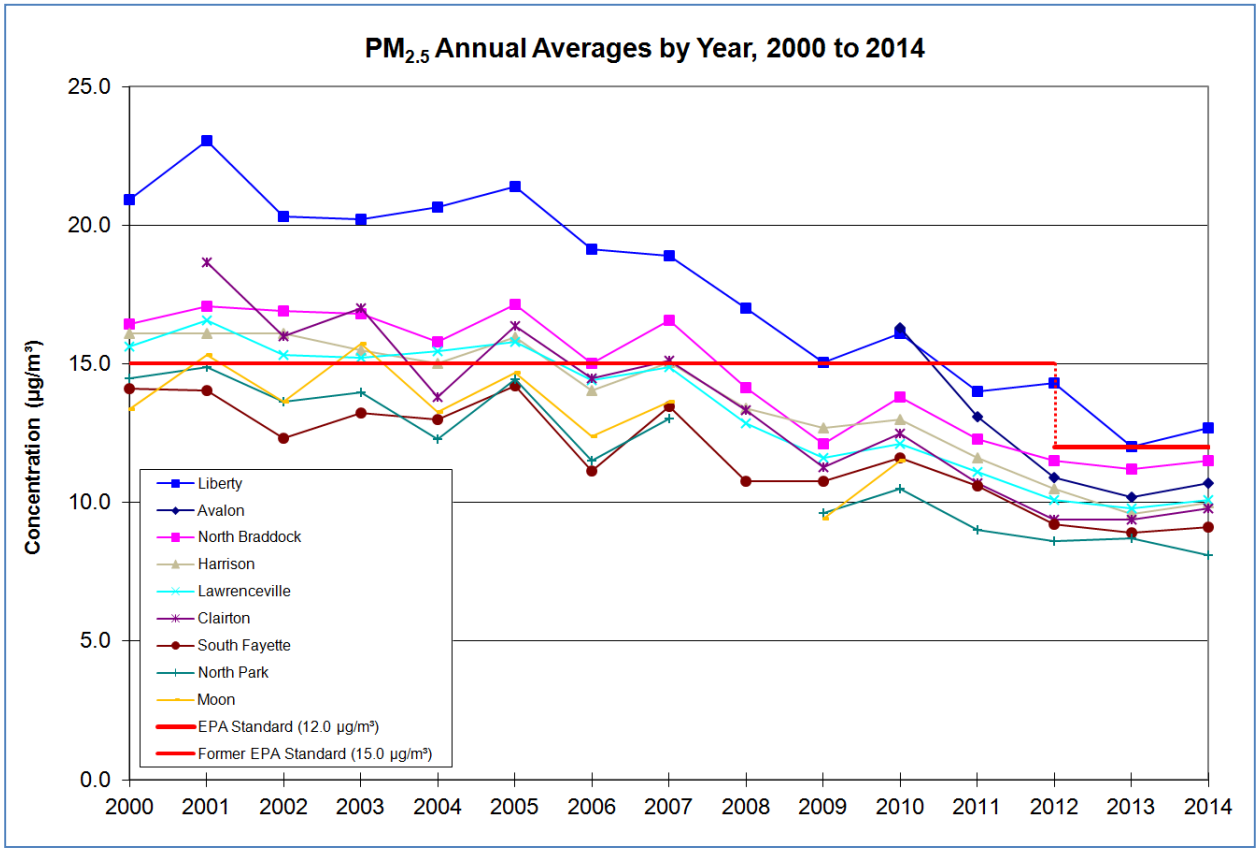


ACHD intends to purchase and deploy four new continuous $PM_{2.5}$ monitors. One of these continuous monitors will go to the Parkway East Near-Road site. If monitoring at Flag Plaza begins, then a continuous monitor would be deployed. Additionally, a site like Clairton would have greater value with a continuous monitor. ACHD would collocate a continuous monitor with the filter based FRM to establish equivalency. If the monitors correlate well, then the continuous monitor can replace the resource intensive filter-based monitor. Also, additional continuous monitors in the Liberty-Clairton area provide real time data that would better serve not only the population but data users including researchers and air quality modelers. Careful and thoughtful upgrades to the $PM_{2.5}$ network are necessary but also valuable. The more robust the data set, the higher value it has. Deploying new technology is necessary to reach the goal of best serving the population of Allegheny County.

4.6. Monitoring Data Trends

Figure 4-10 displays Annual average from 2000 to 2014. This includes the Moon site which is no longer in operation.

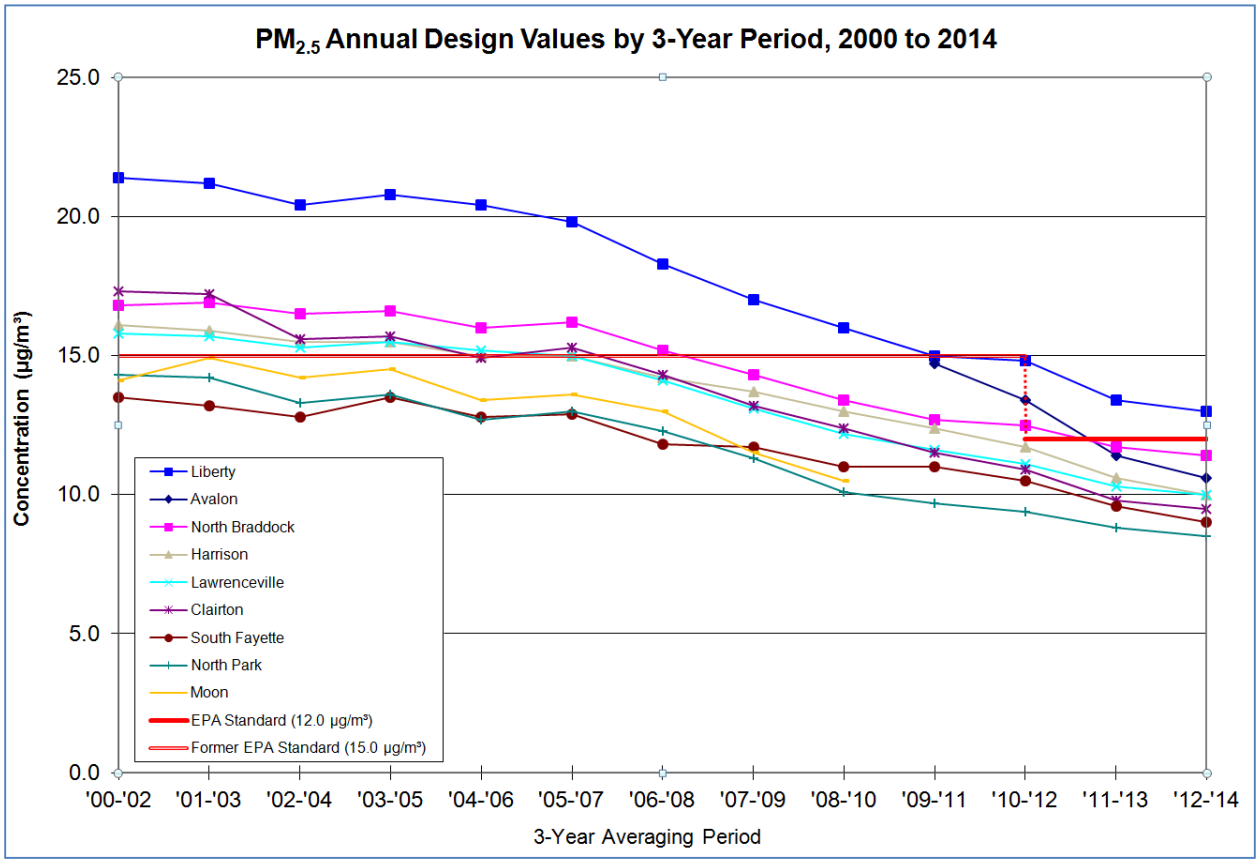
Figure 4-10. $PM_{2.5}$ Long-Term Annual Average Trends, 2000-2014



$PM_{2.5}$ concentrations have decreased steadily from 2000. Most monitors in the county are below the most recent $PM_{2.5}$ standard of 12.0 µg/m³ with the exception of the Liberty monitor. In the most recent year, concentrations have flattened or rose slightly. This could be from a more robust economy with greater industrial activity.

Figure 4-11 below display $PM_{2.5}$ annual design values from 2000 to 2014.

Figure 4-11. $PM_{2.5}$ Annual Design Values, 2000-2014



The three year averages show a smoother decline in concentration with the Liberty monitor still being the highest monitor in the county.

Figure 4-12 displays the 24 hour 98th percentile values by year. There has been a decline in the 98th percentile concentrations since 2000. All sites were below the standard of 35 µg/m³ in 2013 and 2014. The Clairton monitor showed an increase from 17.1 µg/m³ to 31.2 µg/m³. This trend is not in line with the rest of the network and should be closely scrutinized.

Figure 4-12. $PM_{2.5}$ 24 hour 98th Percentile Values, 2000-2014

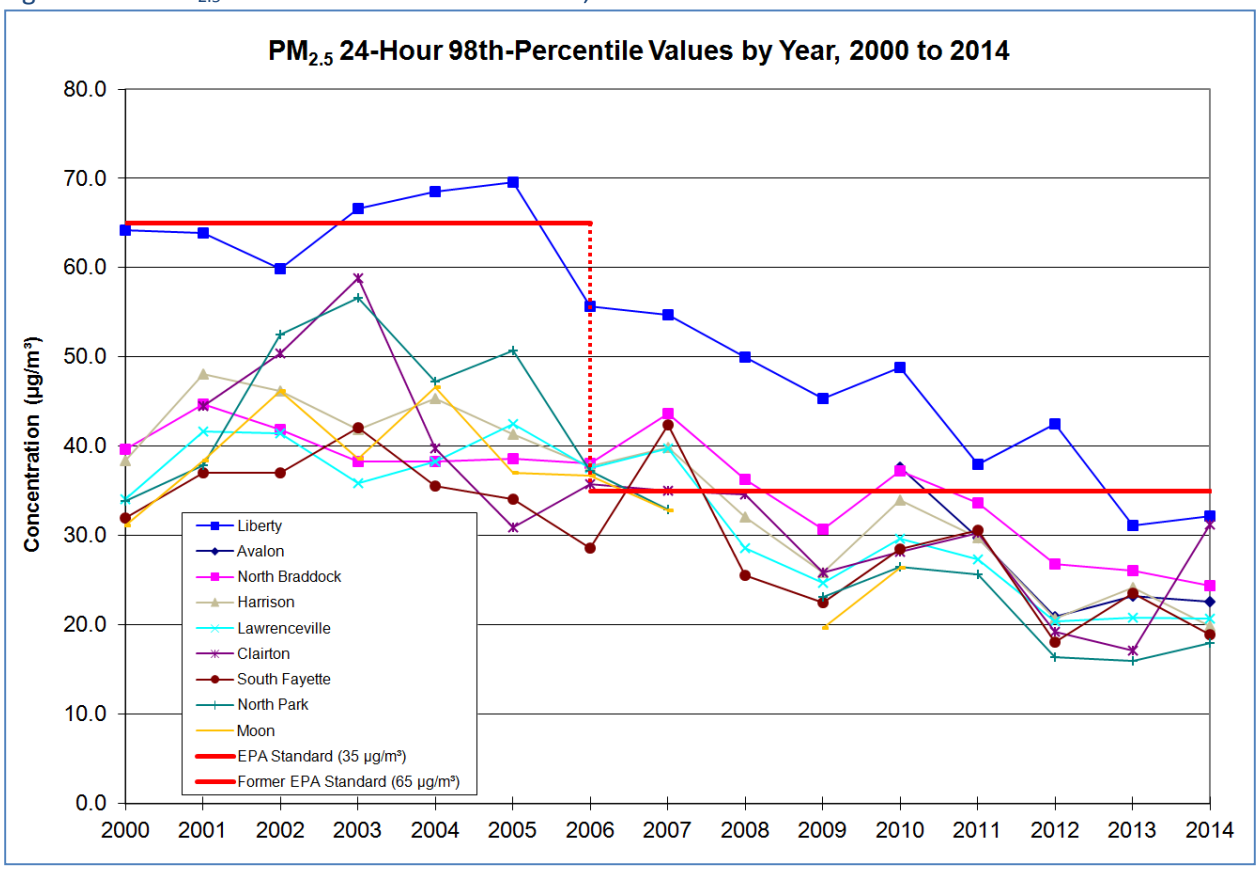
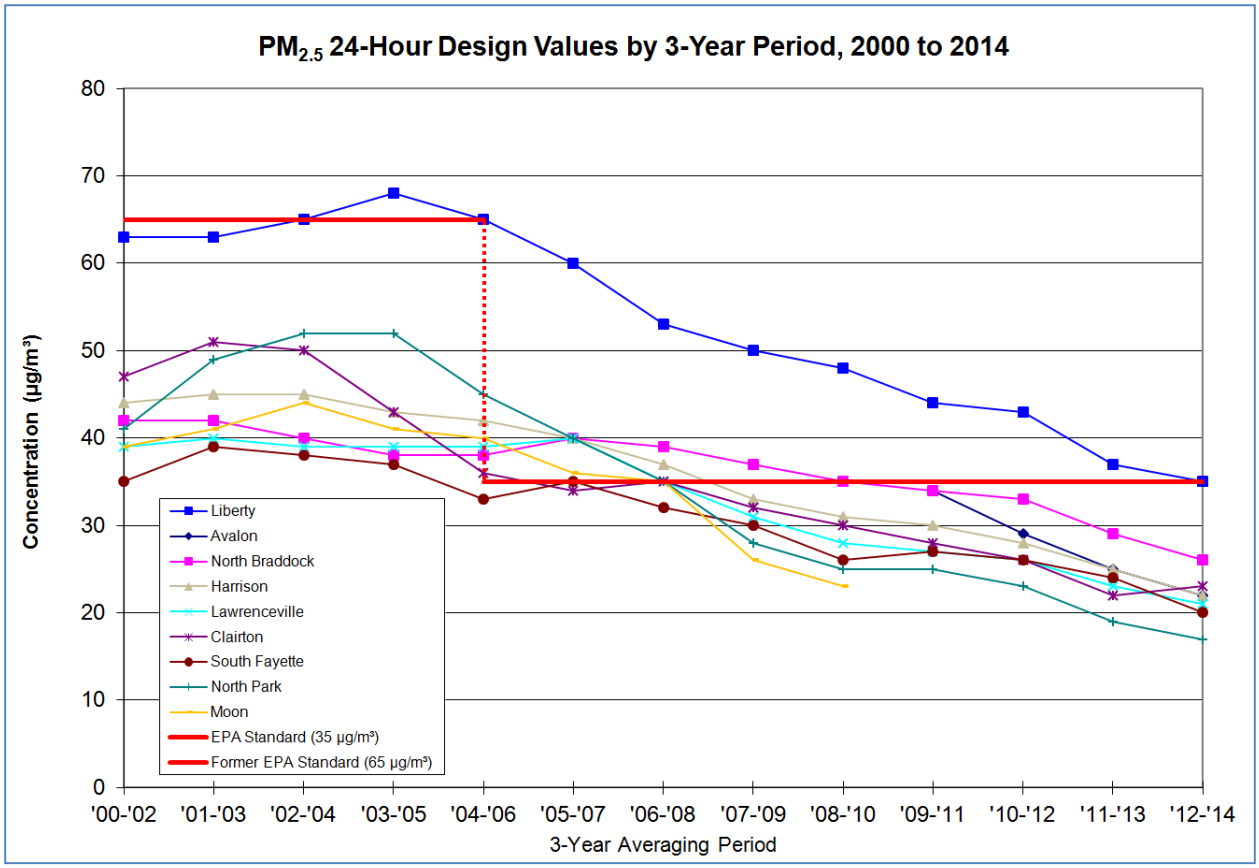


Figure 4-13 displays the 24 hour design values (3-year averages of 98th-percentiles) by 3-year period.

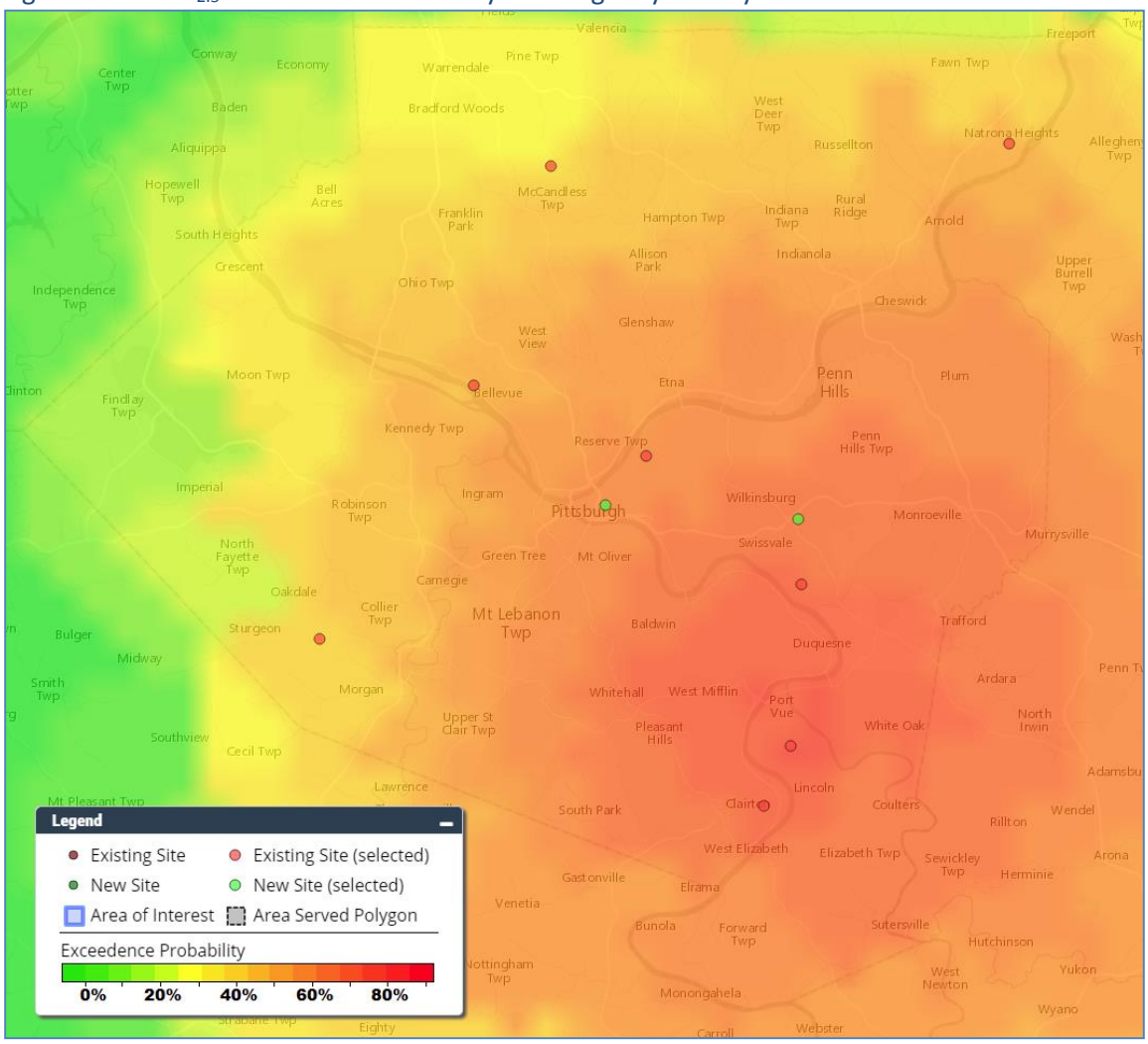
Figure 4-13. $PM_{2.5}$ 24 hour Design Values, 2000-2014



4.7. Exceedance Probability

Figure 4-14 shows the exceedance probability map for $PM_{2.5}$ created by the NetAssess application. This tool creates a map by using a spatial distribution of the highest concentrations at each monitor to estimate other areas where extreme concentrations may occur. Of the Parkway East Near-Road and Flag Plaza sites, Parkway East Near-Road would likely have the higher concentration.

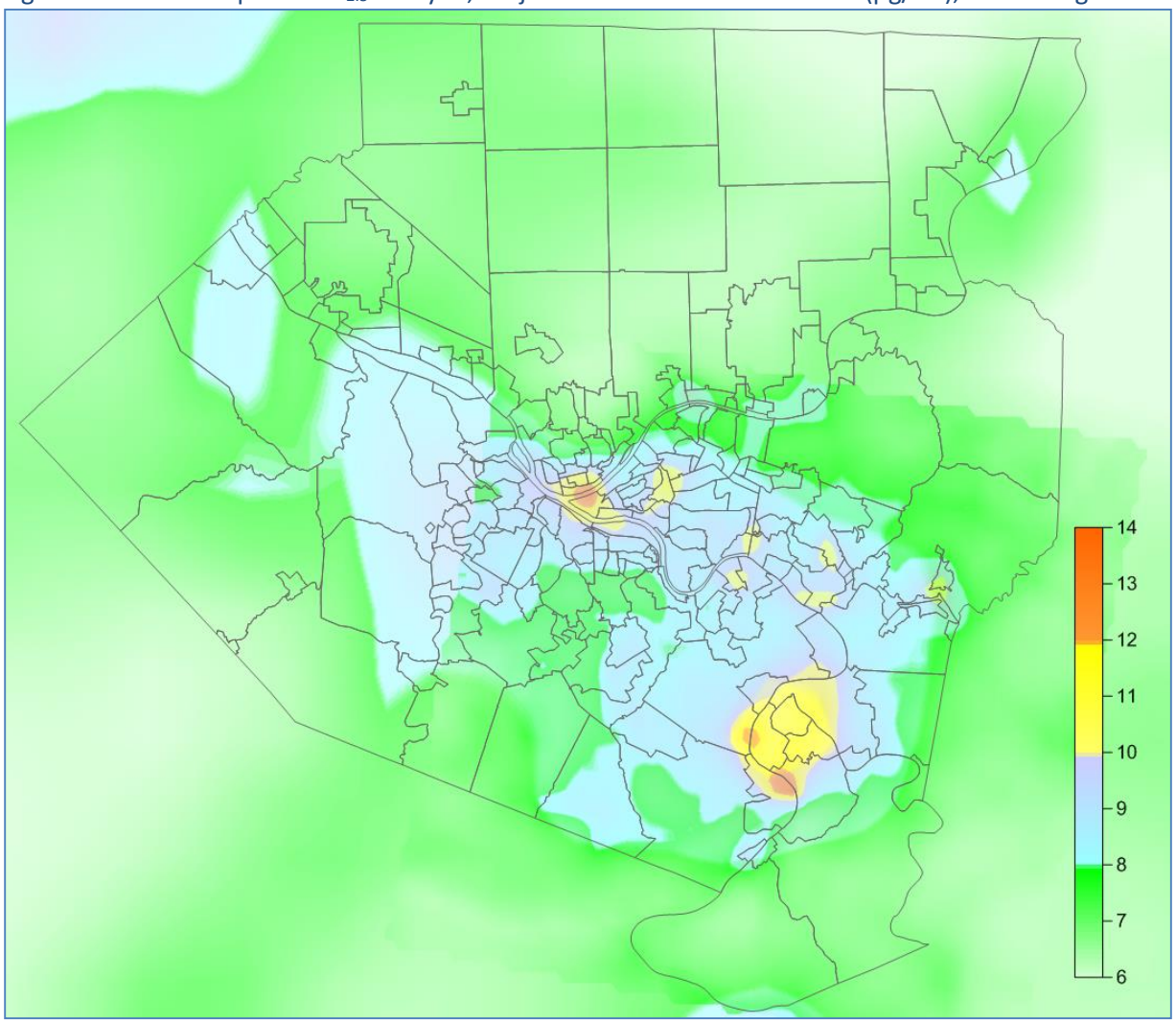
Figure 4-14. $PM_{2.5}$ Exceedance Probability for Allegheny County



Modeling from the 2006 NAAQS SIP[3] can show refined results for Allegheny County projected annual impacts. The projected case was based on CAMx gridded modeling and Modeled Attainment Test Software (MATS) results over a 5-year timeframe of 2012-2016 (weighted to 2014).

Figure 4-15 below shows the refined impact map from the MATS results. The City of Pittsburgh and the Monongahela Valley are based on 0.8 km grid resolution; the remaining portions of the county are based on 4 km resolution spatial fields.

Figure 4-15. MATS Spatial $PM_{2.5}$ Analysis, Projected Annual Concentrations (µg/m³), 2014 Weighted



Modeled results from the 2006 NAAQS SIP showed that the majority of Allegheny County was projected to be well below 12.0 µg/m³ on an annual basis. Areas with the highest concentrations (the orange areas) were the Liberty-Clairton and Downtown Pittsburgh areas.

[3] Submitted to EPA in June 2013.

The Liberty-Clairton area is already accounted for by the Liberty and Clairton monitors. Furthermore, the controls in the 2006 NAAQS SIP were based on a 5-year timeframe (2012-2016), and reductions are expected to continue through 2016. (Note that SIP development has begun in 2015 for attainment of the 2012 NAAQS.)

The modeled hotspot in Downtown Pittsburgh hotspot may be due to sources that have since modified their operations. However, results from city-based studies suggest that diesel from mobile sources continues to be a significant contributor to $PM_{2.5}$ in urban areas. This provides further evidence that an appropriate location for future $PM_{2.5}$ monitoring may be Flag Plaza, an already established ACHD site. Proximity to both downtown and residential neighborhoods may deem Flag Plaza appropriate for city-wide urban surveillance as well as population exposure.

Additional areas in the 10.0-12.0 $\mu g/m^3$ range (shown in yellow) are accounted for by the current network, including Lawrenceville and North Braddock. The Parkway East Near-Road site, which will include a $PM_{2.5}$ monitor by Jan. 1, 2017, also appears to be an appropriate area for surveilance, with values in the 10-12.0 $\mu g/m^3$ range.

4.8. Rankings

Table 4-3 below provides the scoring and ranking data for the $PM_{2.5}$ FRM sites.

Table 4-3. $PM_{2.5}$ FRM Rankings

PM2.5 (FRM) Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 24-Hour Design Value (µg/m³)	2012-2014 Annual Design Value (µg/m³)	Site Objective	Population Served Density (pop./mi²)	Closest Site (km)	Notes
Liberty	2	16	35	13.0	Population Exposure	1179	4	Also non-FRM
Lawrenceville	4	15	21	10.0	Population Exposure	3851	10	Also non-FRM
North Braddock	2	16	26	11.4	Population Exposure	2046	9	
Harrison	2	16	22	10.0	Population Exposure	504	25	
South Fayette	3	16	20	9.0	Population Exposure	1058	16	
Avalon	2	4	22	10.6	Population Exposure	1761	10	
Clairton	1	14	23	9.5	Population Exposure	792	4	
North Park	0	15	17	8.5	Population Exposure	549	13	

PM2.5 (FRM) Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 24-Hour Design Value	2012-2014 Annual Design Value	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Liberty	0.50	0.50	2.00	2.17	1.0	0.50	0.00	1.0	7.7	**1**
Lawrenceville	1.00	0.50	1.20	1.67	1.0	1.00	0.25	1.0	7.6	**2**
North Braddock	0.50	0.50	1.49	1.90	1.0	0.75	0.25	1.0	7.4	**3**
Harrison	0.50	0.50	1.26	1.67	1.0	0.25	1.00	1.0	7.2	**4**
South Fayette	0.75	0.50	1.14	1.50	1.0	0.50	0.75	1.0	7.1	**5**
Avalon	0.50	0.00	1.26	1.77	1.0	0.50	0.25	1.0	6.3	**6**
Clairton	0.25	0.50	1.31	1.58	1.0	0.25	0.00	1.0	5.9	**7**
North Park	0.00	0.50	0.97	1.42	1.0	0.25	0.50	1.0	5.6	**8**

Liberty showed the highest importance overall, based on design values and site data. All sites showed significance (no low scores) to the network based on the ranking methodology. All sites are also located within the Allegheny County nonattainment area, based on the 2012 NAAQS. North Park is the lowest overall based on design values and population served density.

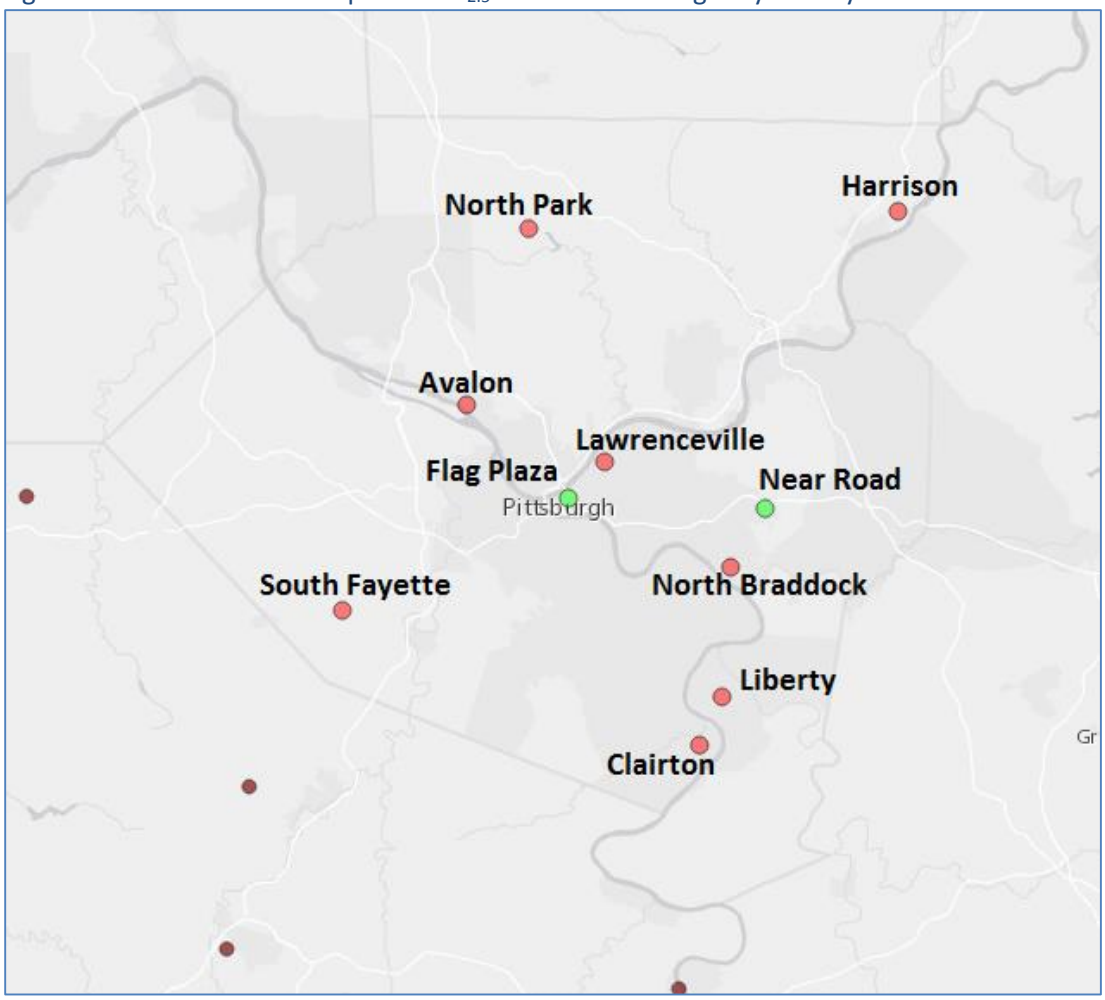
Parkway East Near-Road will be an additional site by Jan. 1, 2017.

4.9. Summary

Allegheny County has a dense $PM_{2.5}$ network. Although the objective for all $PM_{2.5}$ is population exposure, each monitor has additional value as industrial and urban surveillance, transport, and background objectives. A continuous $PM_{2.5}$ monitor will be installed at the Parkway East Near-Road monitoring site per regulatory requirements. The Flag Plaza monitoring station in downtown Pittsburgh would be a strong candidate for another continuous $PM_{2.5}$ monitor. The downtown area may have different concentrations than the urban Lawrenceville site. Additional modifications being considered to the $PM_{2.5}$ network are deploying continuous monitors to replace the resource and time intensive filter based monitors. This would be on a limited basis after a period of collocation to establish equivalency.

Figure 4-15 shows the current $PM_{2.5}$ network which are indicated by the red dots and the proposed future sites in green.

Figure 4-16. Current and Proposed $PM_{2.5}$ Network for Allegheny County

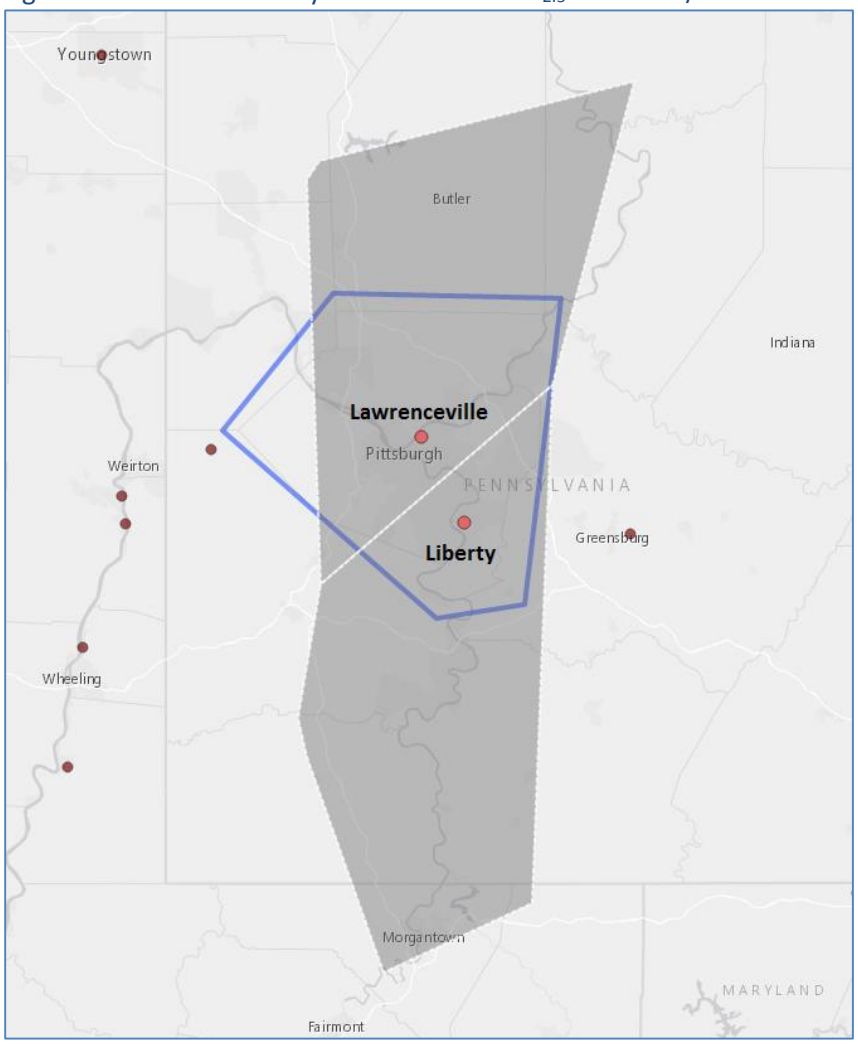


5. $PM_{2.5}$ Non-FRM/FEM Analysis

5.1. $PM_{2.5}$ Non-FRM Area Served

The area served for $PM_{2.5}$ non-FRM/FEM monitors are shown on the map in Figure 5-1 below. Both Liberty and Lawrenceville operate $PM_{2.5}$ Chemical Speciation Network (CSN) Monitors and Tapered Element Oscillating Microbalance (TEOM) monitors.

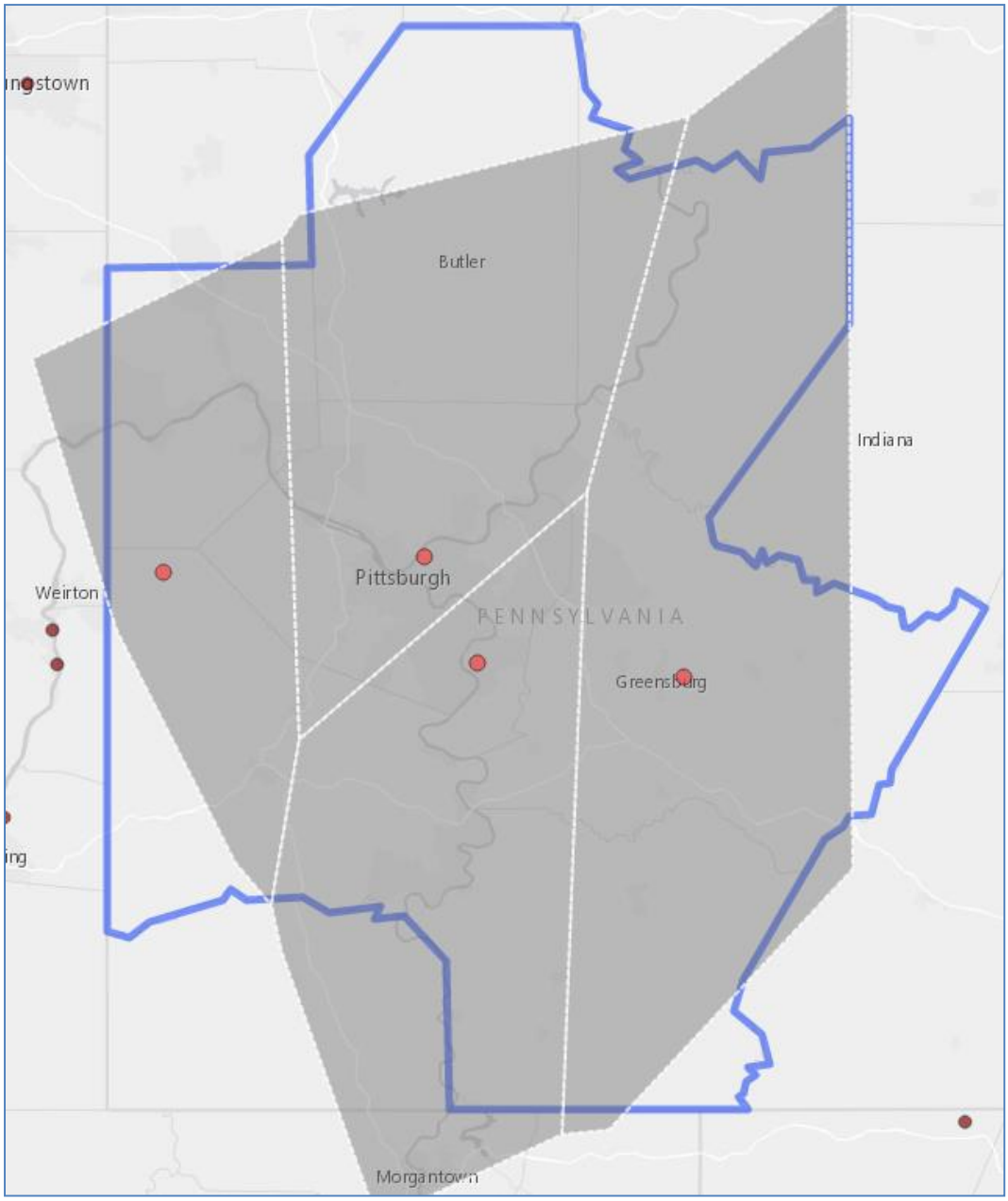
Figure 5-1. Area Served by Current ACHD $PM_{2.5}$ Non-FRM/FEM Network



Lawrenceville is representative of Pittsburgh and the urban sprawl. Liberty serves the Liberty-Clairton Nonattainment Area. The TEOM monitors provide real time data to the AirNow System which issues the forecast for the Air Quality Index.

Figure 5-2 below shows the area served by CSN speciation monitors in SWPA. These monitors are used for comparisons of regional and localized species of $PM_{2.5}$ throughout SWPA.

Figure 5-2. Area Served by $PM_{2.5}$ Speciation Monitors in SWPA



5.2. New Sites

There will be no additional continuous non-FEM sites added to the current TEOM network. Any additional continuous monitors will be FEMs.

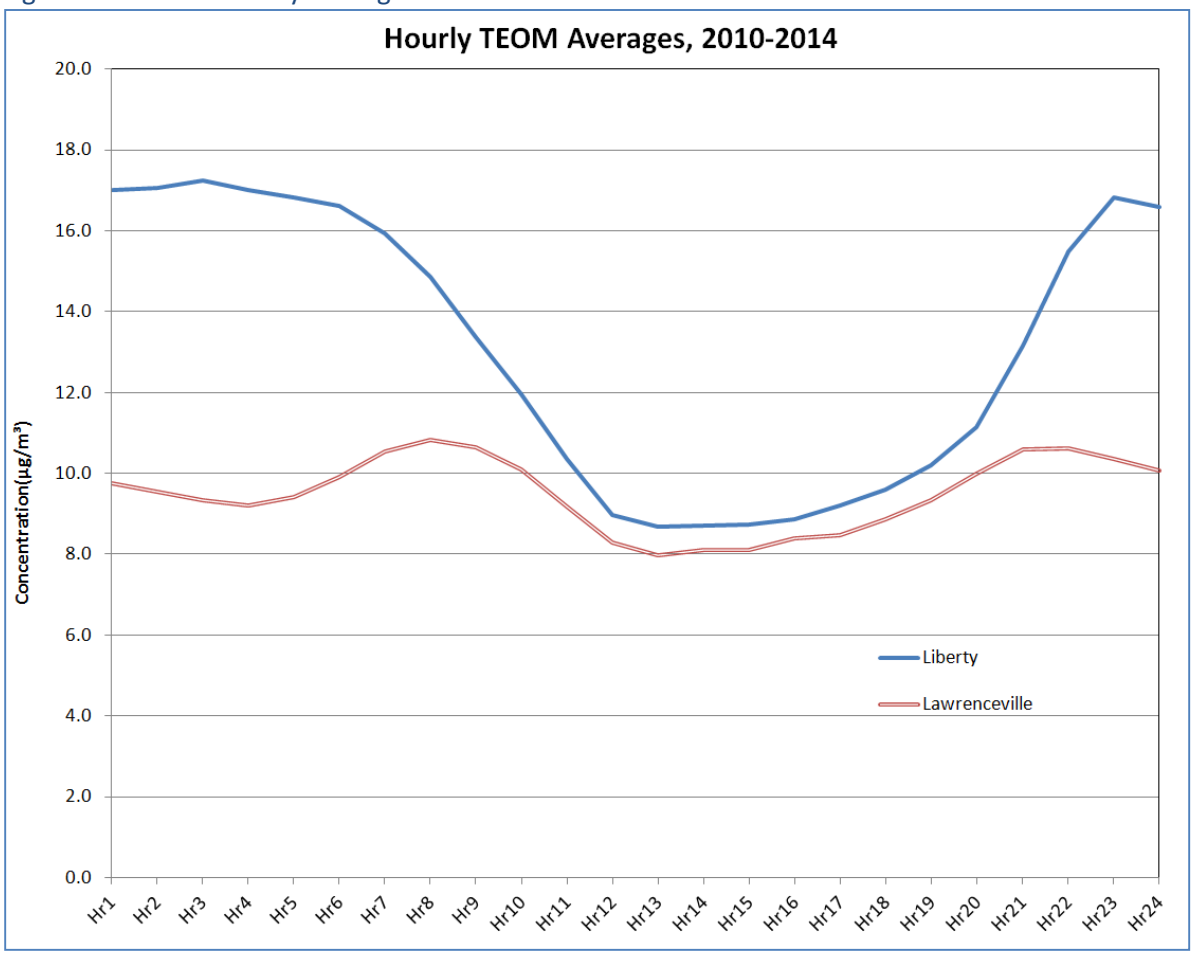
5.3. Emissions

$PM_{2.5}$ emissions are shown in the previous section (Section 4).

5.4. Monitoring Data Trends

Figure 5-3 below shows hourly averages for the Allegheny County TEOM monitors for 2010-2014.

Figure 5-3. TEOM Hourly Averages



Liberty records a large variation in $PM_{2.5}$ concentrations on a diurnal basis, due to the strong influence of inversions that lead to nighttime accumulation of particles in the Liberty-Clairton area. Lawrenceville maintains a fairly steady level of $PM_{2.5}$ throughout the day, with small peaks during rush-hour periods.

5.5. Rankings

Table 5-1 below shows the ranking values and score/rank for the $PM_{2.5}$ TEOM monitors in Allegheny County based on the ranking methodology.

Table 5-1. $PM_{2.5}$ TEOM Rankings

PM2.5 TEOM Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2014 24-Hour Max (µg/m^3)	2014 Annual Average (µg/m^3)	Site Objective	Population Served Density (pop./mi^2)	Closest Site (km)
Liberty	2	16	49.2	11.6	Population Exposure	474	18
Lawrenceville	4	15	24.6	8.9	Population Exposure	925	18

PM2.5 TEOM Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2014 24-Hour Max	2014 Annual Average	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Liberty	0.50	0.50	2.81	1.93	1.0	0.00	0.75	1.0	8.49	**1**
Lawrenceville	1.00	0.50	1.41	1.48	1.0	0.25	0.75	1.0	7.39	**2**

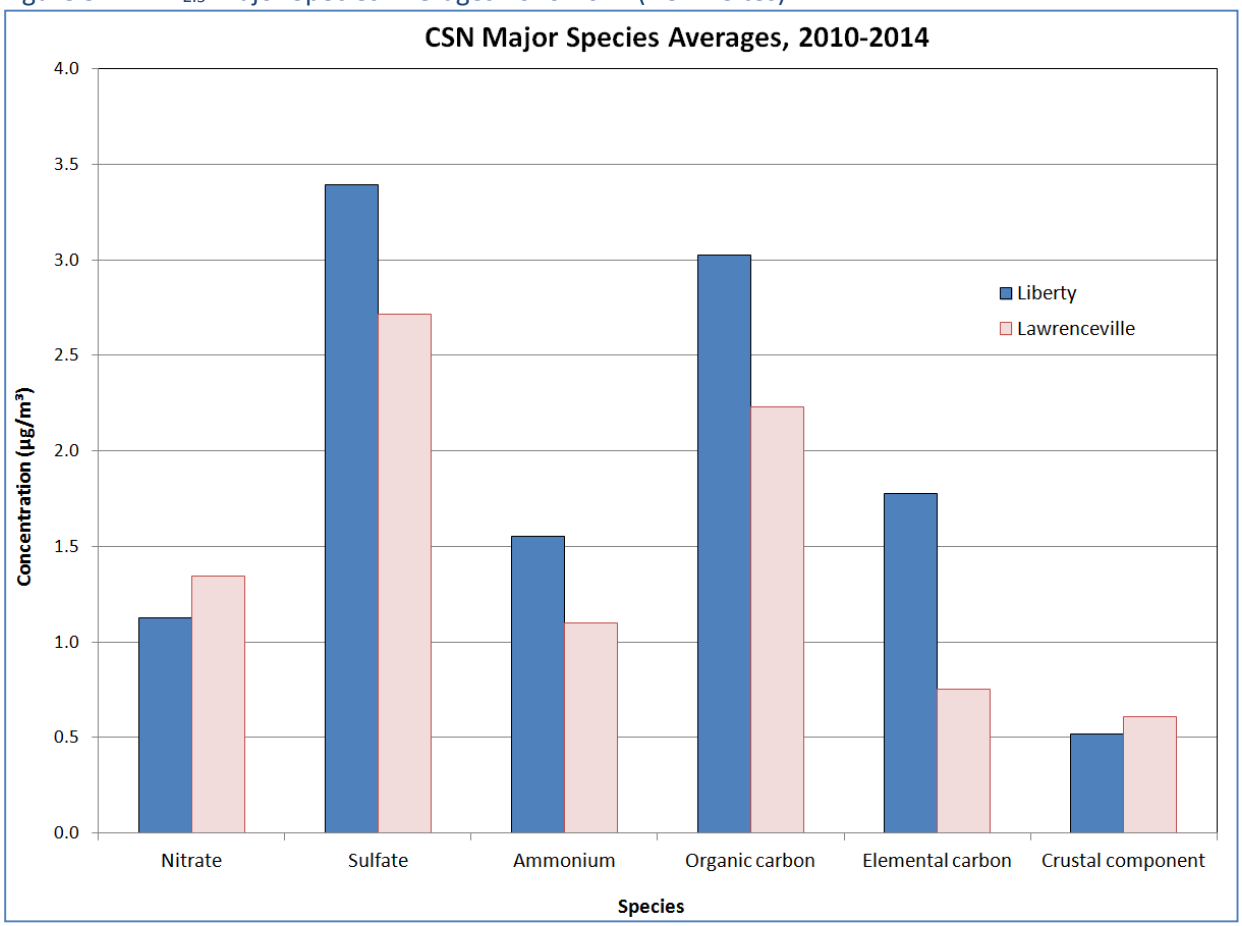
The scoring shows that Liberty is the highest ranked site due to monitored values. Lawrenceville is important due to population served and number of other pollutants at the site.

5.6. Speciation

Liberty and Lawrenceville are the only sites in Allegheny County to operate CSN speciation monitors. Note the chemical speciation network is no longer weighing total $PM_{2.5}$ after October 2014, so major species cannot be directly compared to FRM mass without adjustment of species using the SANDWICH method.[4]

Liberty is directly affected by industrial sources, its concentrations are not indicative of the greater Pittsburgh area. Concentrations at the Lawrenceville monitor describe conditions for the city of Pittsburgh. Major species averages are shown in Figure 5-4.

Figure 5-4. $PM_{2.5}$ Major Species Averages 2010-2014 (ACHD Sites)



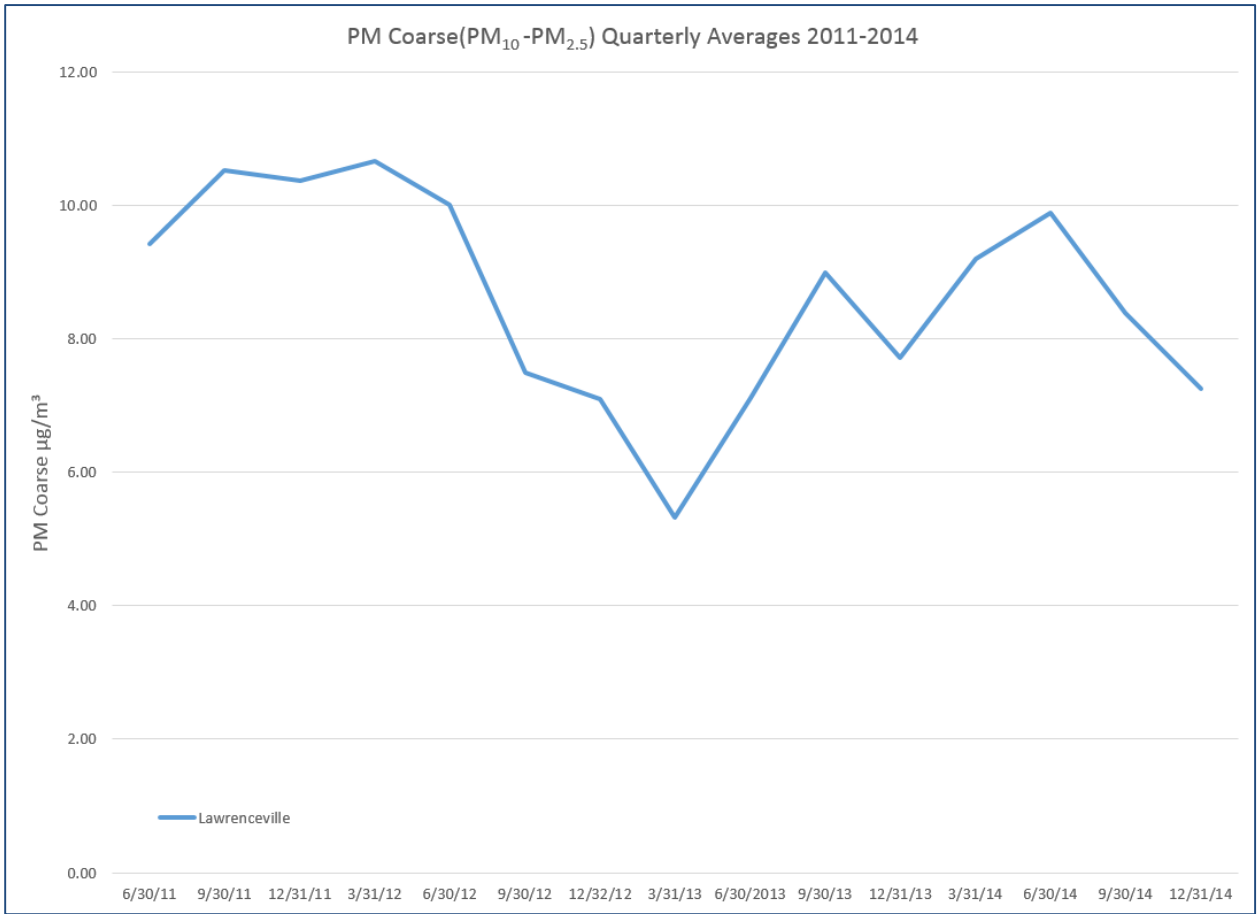
5.7. PM Coarse

Allegheny County also operates two Beta Attenuation Monitors (BAM) at Lawrenceville to record coarse particulate matter. Coarse PM is measured as the arithmetic difference between separate but concurrent, collocated measurements of low volume PM_{10} and $PM_{2.5}$. Lawrenceville operates one coarse pair in Allegheny County as part of regulatory requirements of the NCore network.

[4] http://epa.gov/ttn/analysis/sandwich.htm

Figure 5-5 displays the quarterly averages of PM coarse from 2011-2014. There is no EPA standard for PM coarse.

Figure 5-5. PM Coarse Averages



5.8. Summary

The non-FEM network serves its purpose in Allegheny County. The TEOMs provide hourly data that is sent to the AirNow system and the AQI is generated from that data. It is important to serve both the Liberty Area and the Pittsburgh Area. The chemical speciation monitors are important because they study regional and local contributions of the major species of $PM_{2.5}$ as well as the unique conditions at the Liberty monitor. The PM coarse pair at Lawrenceville will continue to operate as a Special Purpose Monitor (SPM). This network provides additional characterization of particulate matter at the Lawrenceville and Liberty monitoring sites.

6. Ozone (O_3) Analysis

6.1. Area Served

The areas served polygons for ozone monitors in Allegheny County are shown on the map in Figure 6-1 below with Allegheny County sites labeled. The population and area in square miles are displayed in Table 6-1.

Figure 6-1. Allegheny County Ozone Monitoring Network

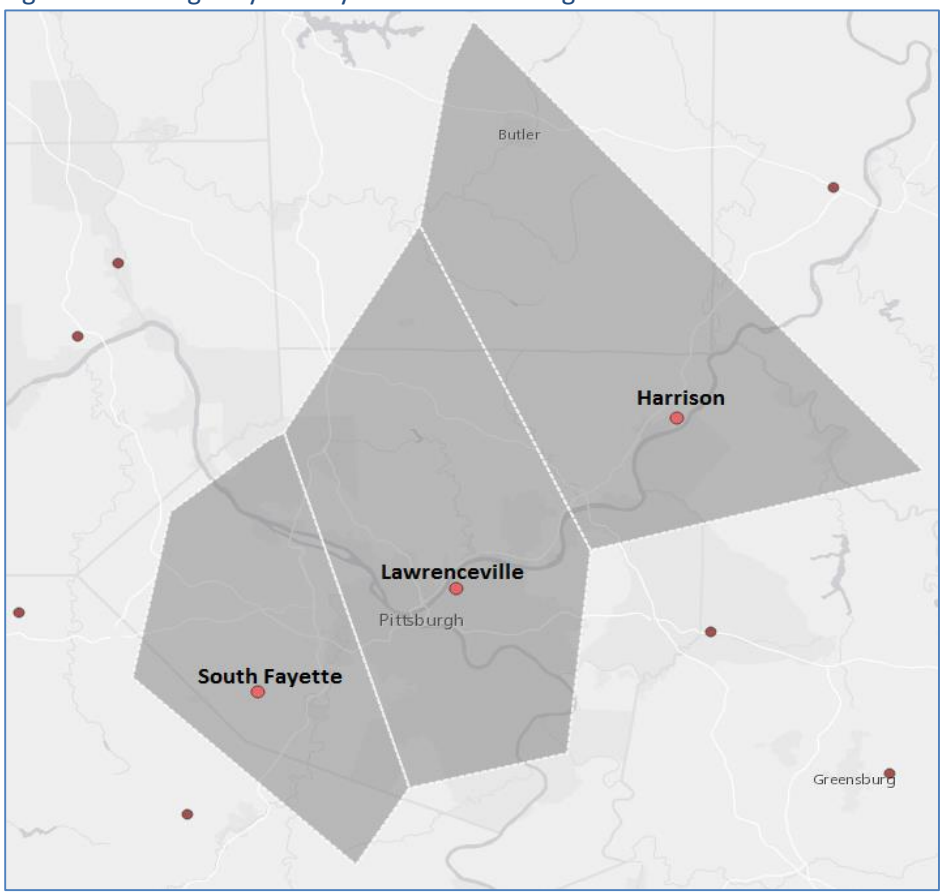
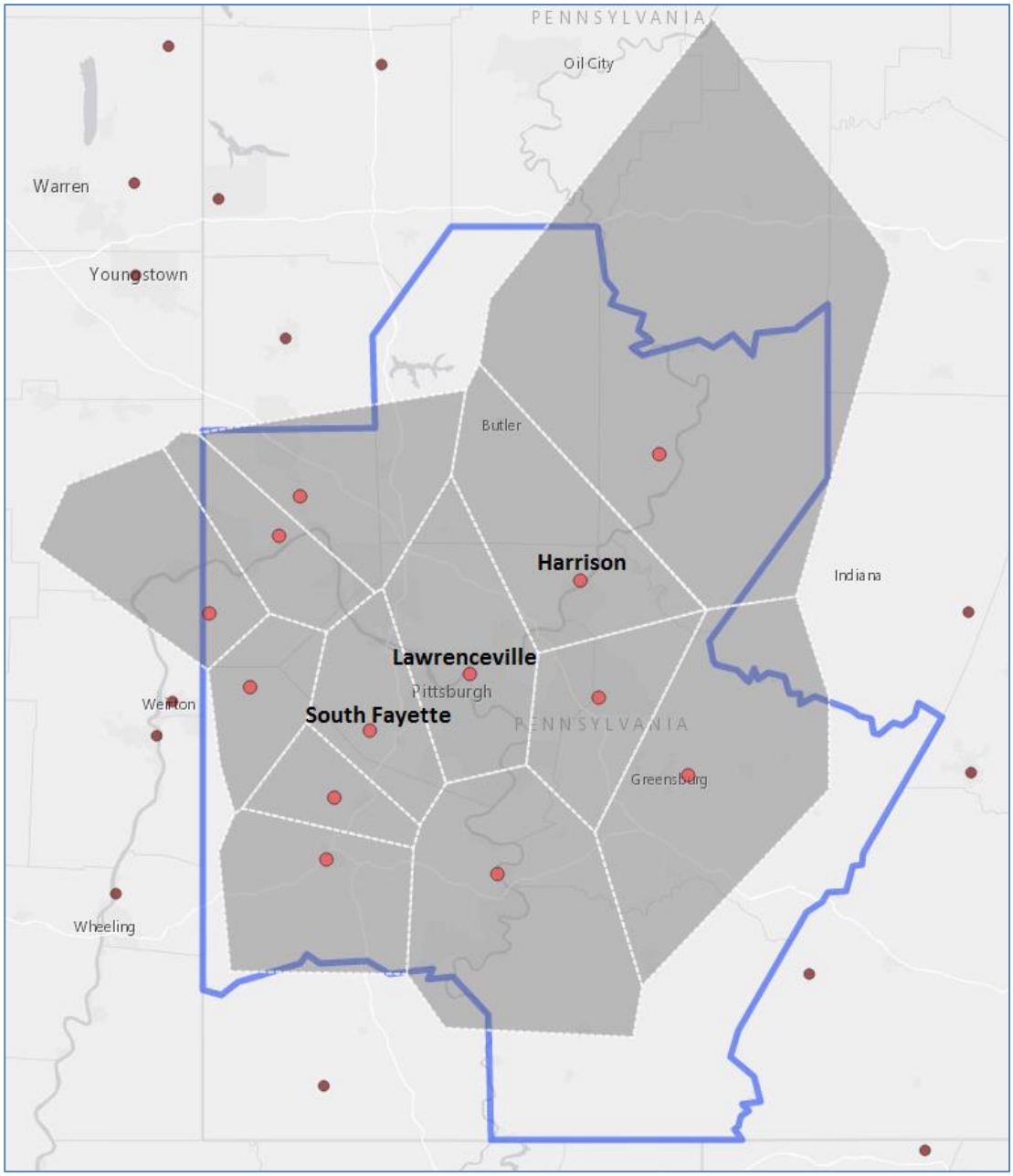


Figure 6-1. Area Served Demographics for Allegheny County Monitors

AQS Site ID	Site Name	Total Population	Area- Miles^2
42-003-0008	Lawrenceville	801,804	341
42-003-0067	South Fayette	231,584	213
42-003-1005	Harrison	202,969	396

Figure 6-2 displays the area polygons for southwestern Pennsylvania with the blue polygon highlighting the Pittsburgh CBSA and ACHD's ozone sights labeled. This dense coverage is necessary to survey the Pittsburgh-Beaver Valley Ozone Nonattainment Area.

Figure 6-2. Southwestern Pennsylvania Ozone Network



Figures 6-3, 6-4, and 6-5 contain area served demographics for each area served polygons. Harrison and South Fayette have similar ages in the area served demographics. Lawrenceville has a different distribution with a sizable portion of people aged 20 to 29.

Figure 6-3 Area Served Demographics for South Fayette

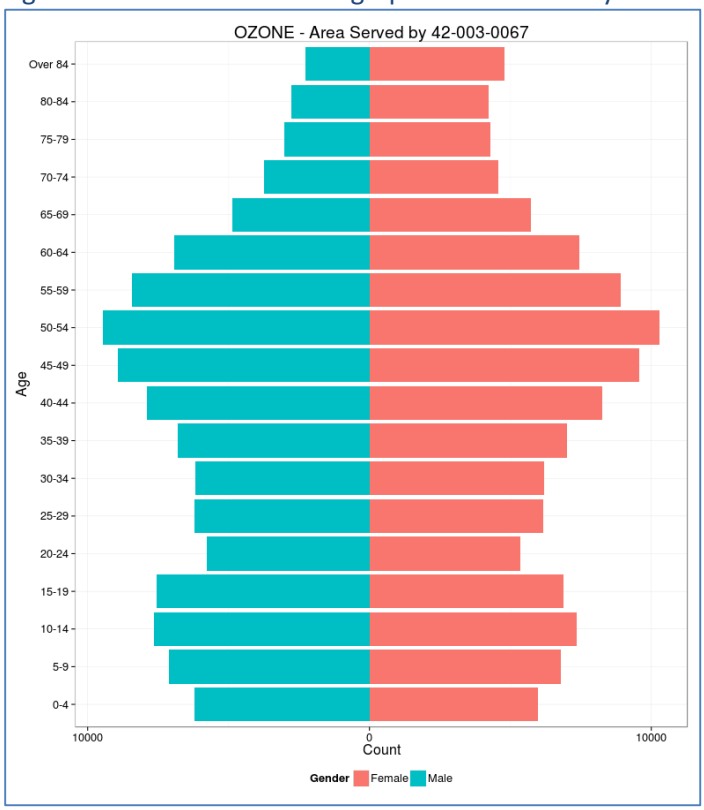


Figure 6-4 Area Served Demographics for Harrison

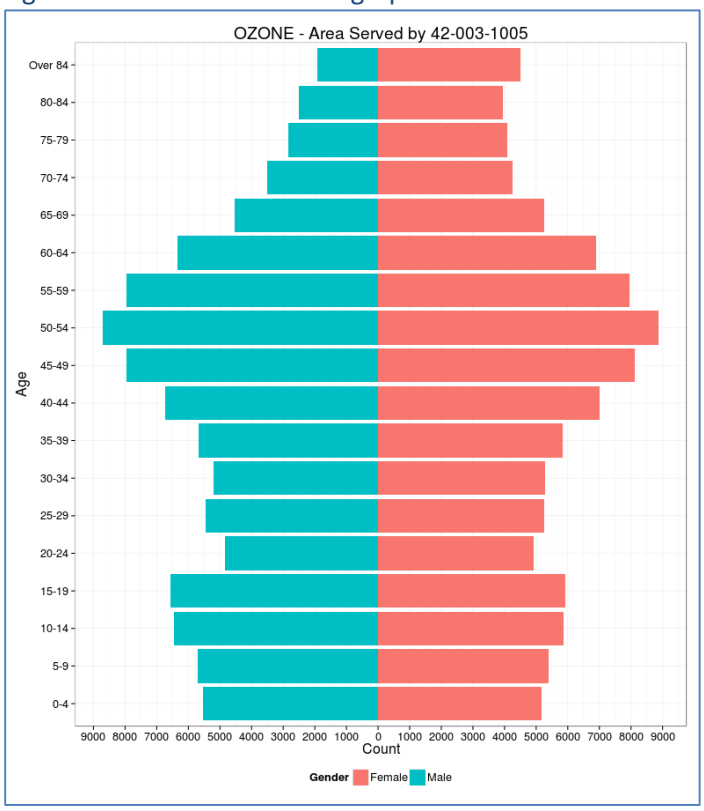
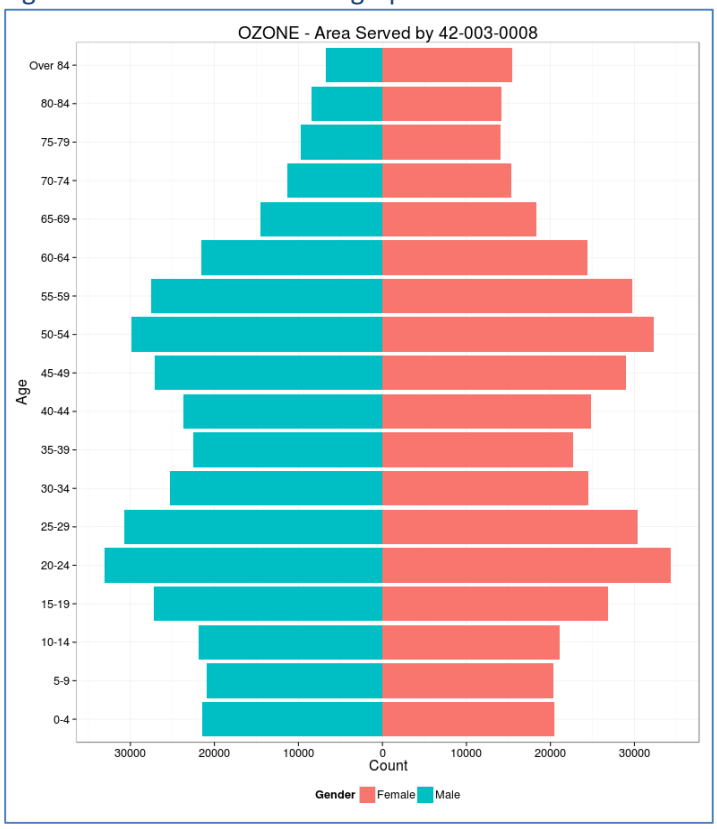


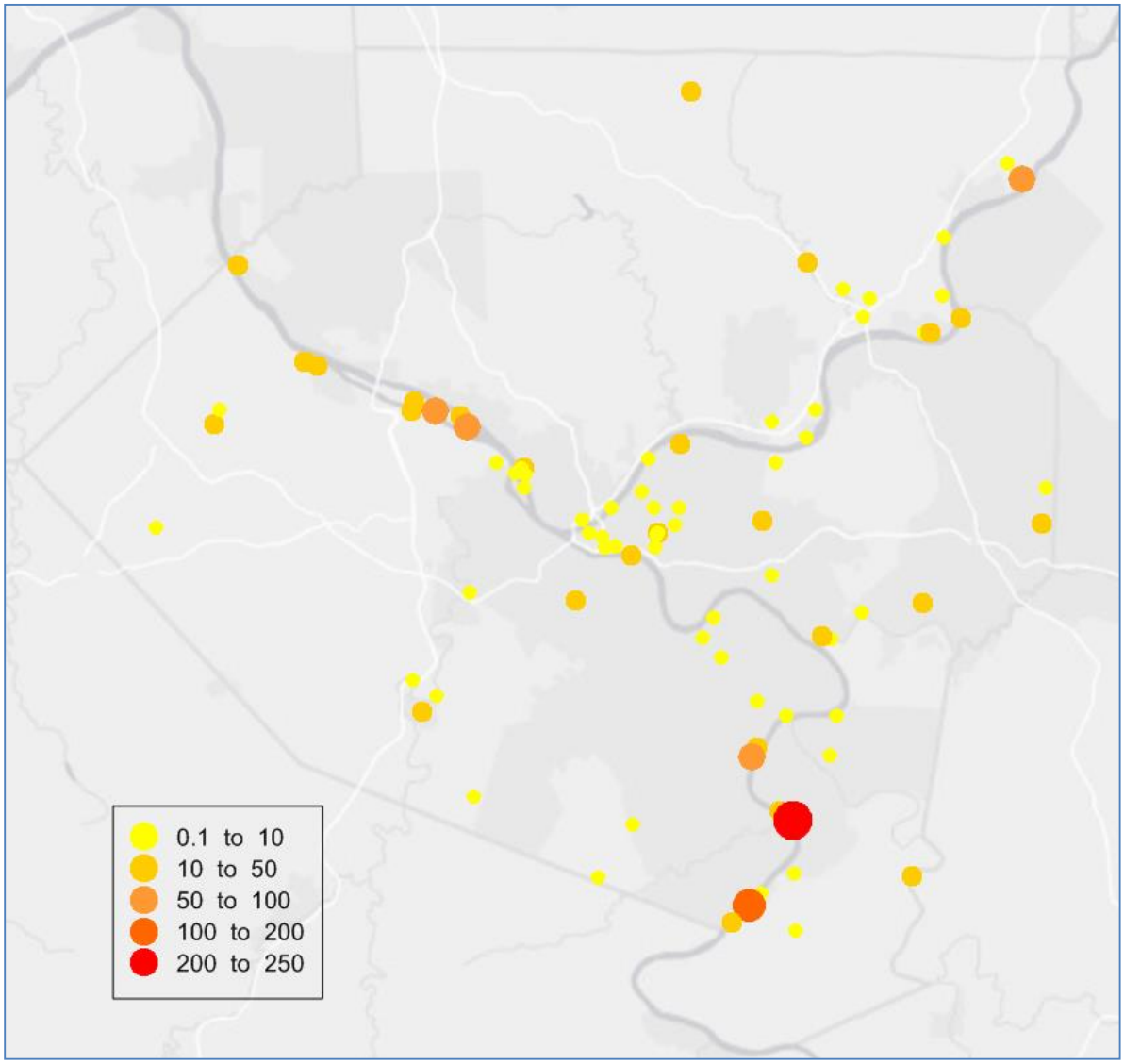
Figure 6-5 Area Served Demographics for Lawrenceville



6.2. Emissions (VOCs)

Figure 6-6 shows point source VOC emissions for Allegheny County sources, based on the 2012 emissions inventory.

Figure 6-6. VOC Point Source Emissions, 2012 (tons actual)

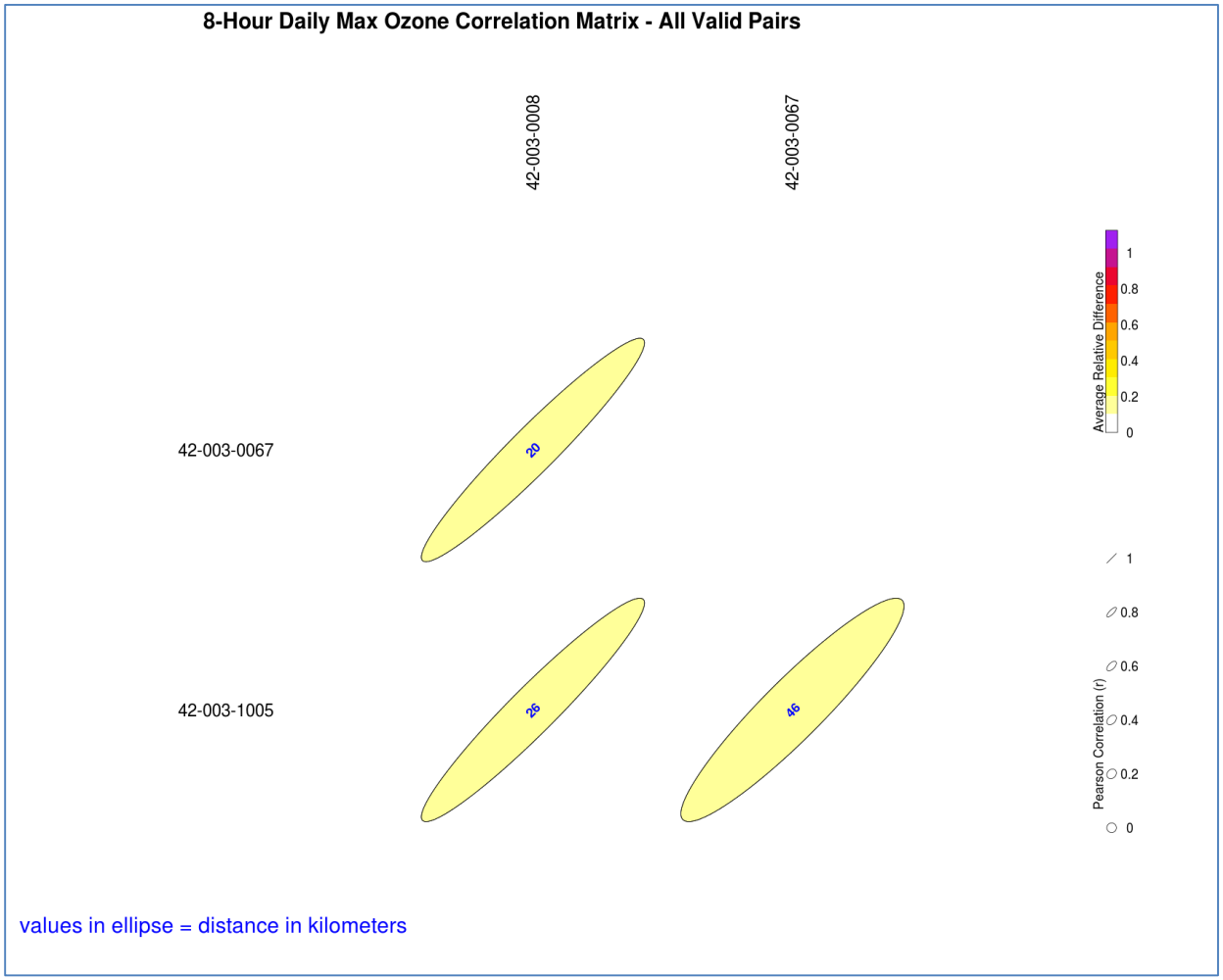


There are several small sources of VOCs throughout the county, along with larger sources in the Monongahela River Valley and Neville Island area. Ozone is formed by a combination of VOC and NO_x emissions in the presence of sunlight (see also NO_2 in Section 9). Mobile source emissions, not represented on this map, also contribute significant amounts of VOCs within the Allegheny County. (See "Section 14. Emissions Inventory" for more discussion.)

6.3. Correlation Matrices

Figure 6-7 below shows the correlation matrix for ozone monitors in Allegheny County based on 2011-2013 data.

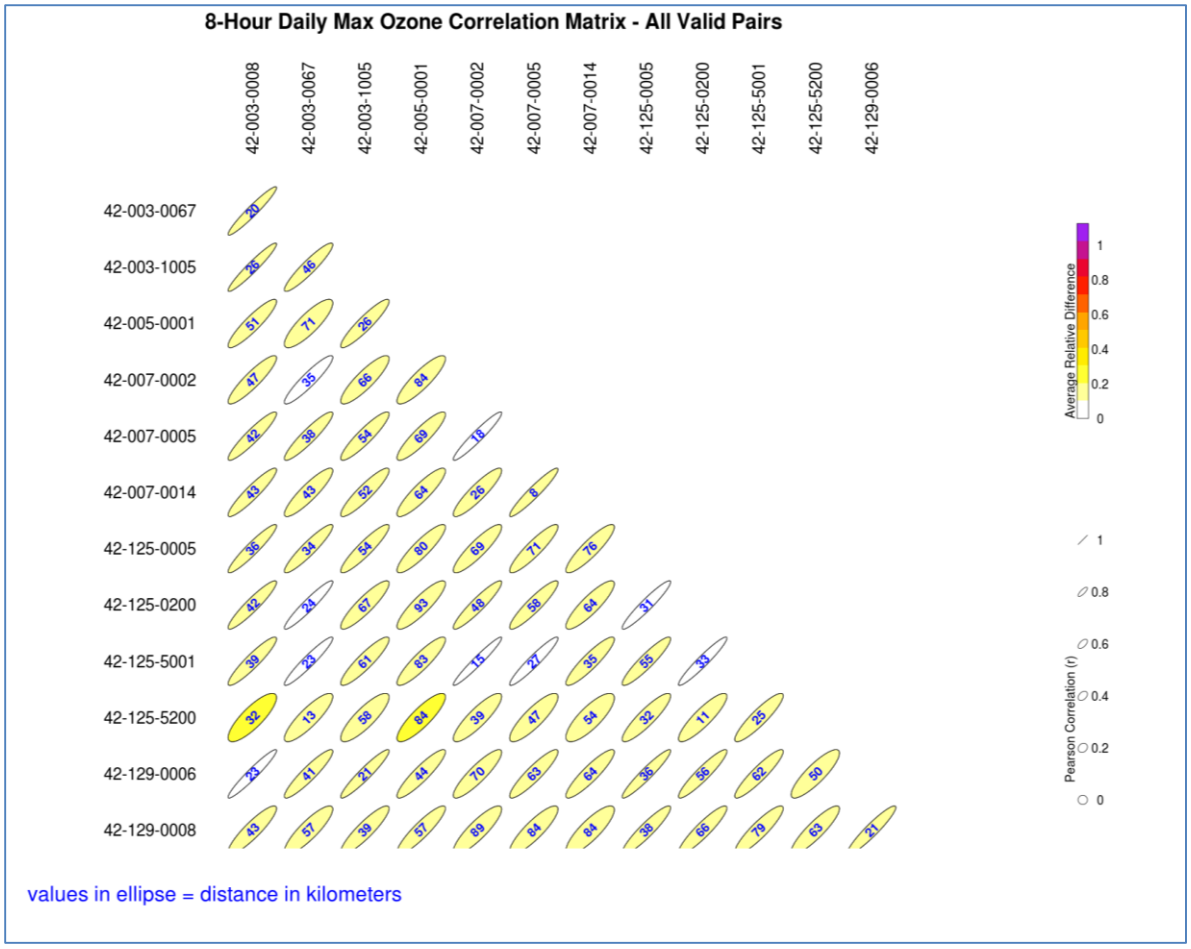
Figure 6-7. Correlation Matrix for ACHD Ozone



The three ozone stations have similar concentrations. Harrison (42-003-1005) and South Fayette (42-003-0067) correlate well with Lawrenceville (42-003-0008). South Fayette and Harrison do not correlate as well to each other.

Figure 6-8 below shows the correlation matrix for the Pittsburgh CBSA ozone monitors based on 2011-2013 averages.

Figure 6-8. Correlation Matrix for Southwestern Pennsylvania

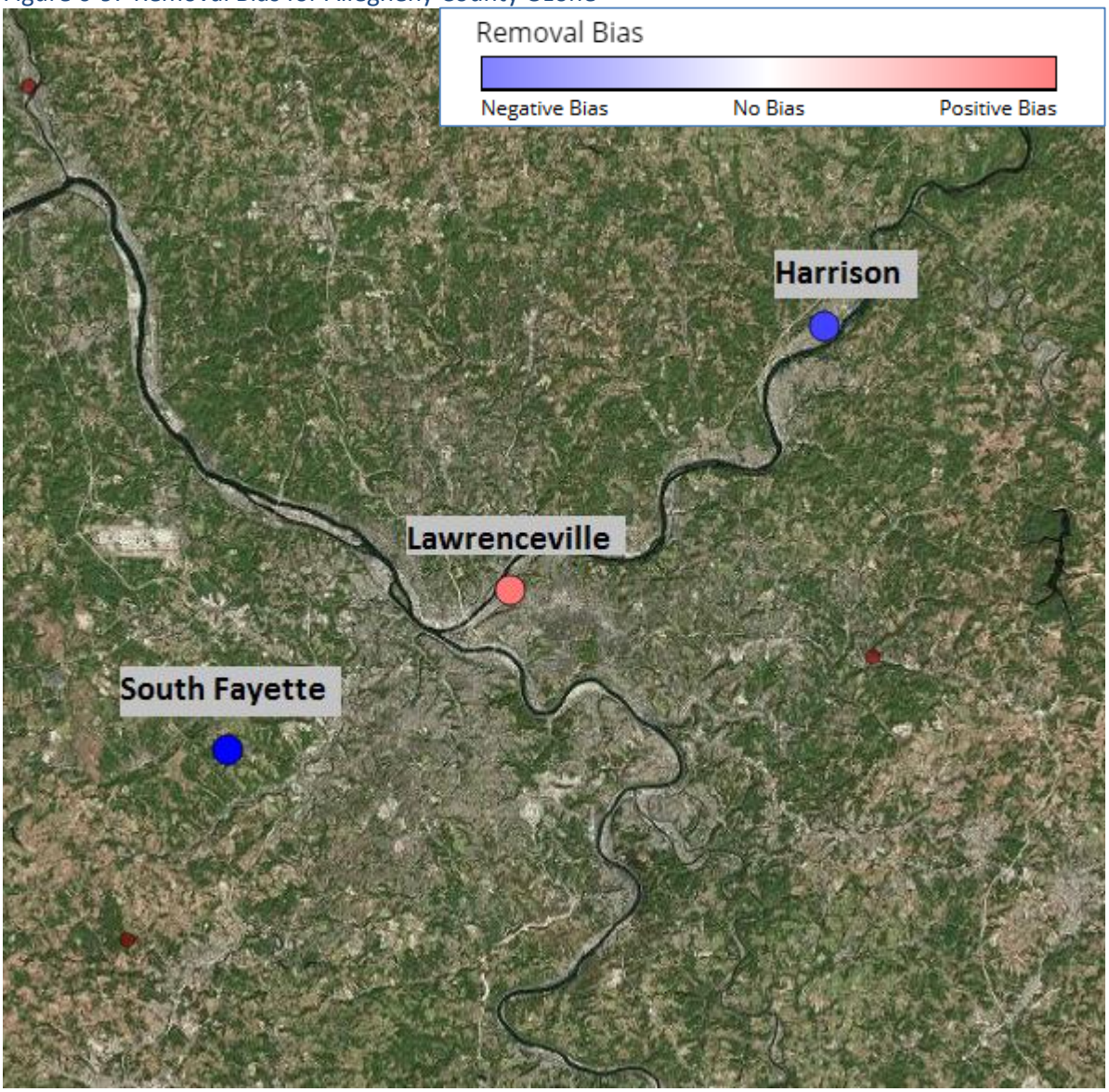


The majority of PA DEP and ACHD sites exhibit low relative differences. PA DEP sites in Washington County, PA correlate well with ACHD's South Fayette site.

6.4. Removal Bias

The removal bias tool uses data from 2011-2013. Data from surrounding PA DEP sites is also used to calculate bias. Figure 6-9 display the results of the removal bias tool for ozone. Removal Bias statistics are displayed in Table 6-2.

Figure 6-9. Removal Bias for Allegheny County Ozone



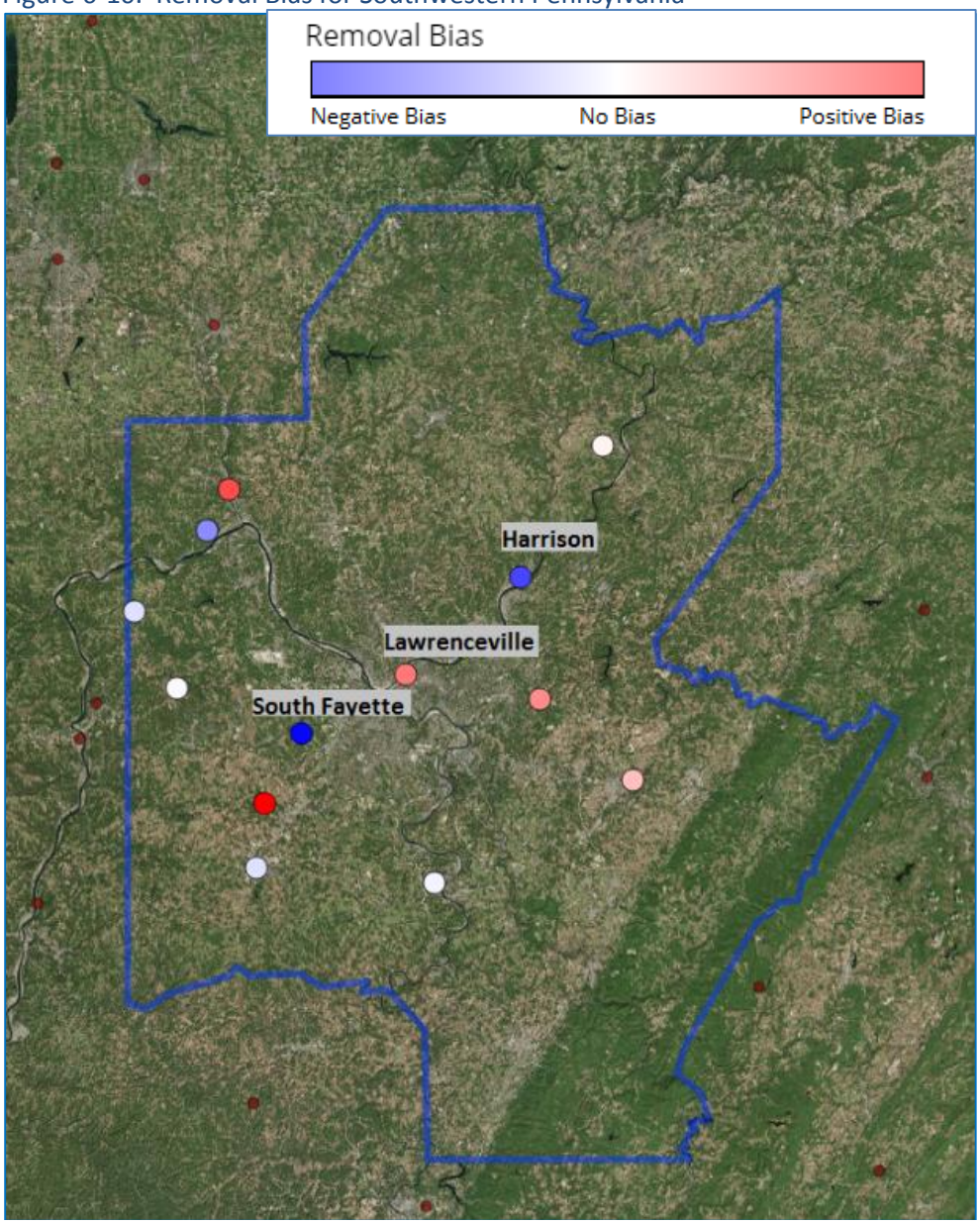
The negative bias at South Fayette and Harrison indicate higher concentrations at PA DEP sites out of county.

Table 6-2. Removal Bias Statistics for Ozone

Site ID	Site Name	Mean Removal Bias	Min Removal Bias	Max Removal Bias	Removal Bias Standard Deviation	Neighbors Included	Mean Relative Removal Bias (%)	Min Relative Removal Bias (%)	Max Relative Removal Bias (%)
42-003-0008	Lawrenceville	0.0021	-0.0184	0.0170	0.003347	5	10	-20	257
42-003-0067	South Fayette	-0.0039	-0.0172	0.0068	0.003724	6	-9	-47	22
42-003-1005	Harrison	-0.0029	-0.0177	0.0102	0.004013	5	-7	-71	46

Figure 6-10 shows the results of the removal bias tool for southwestern Pennsylvania with ACHD sites labeled and the Pittsburgh CBSA highlighted by the blue polygon.

Figure 6-10. Removal Bias for Southwestern Pennsylvania



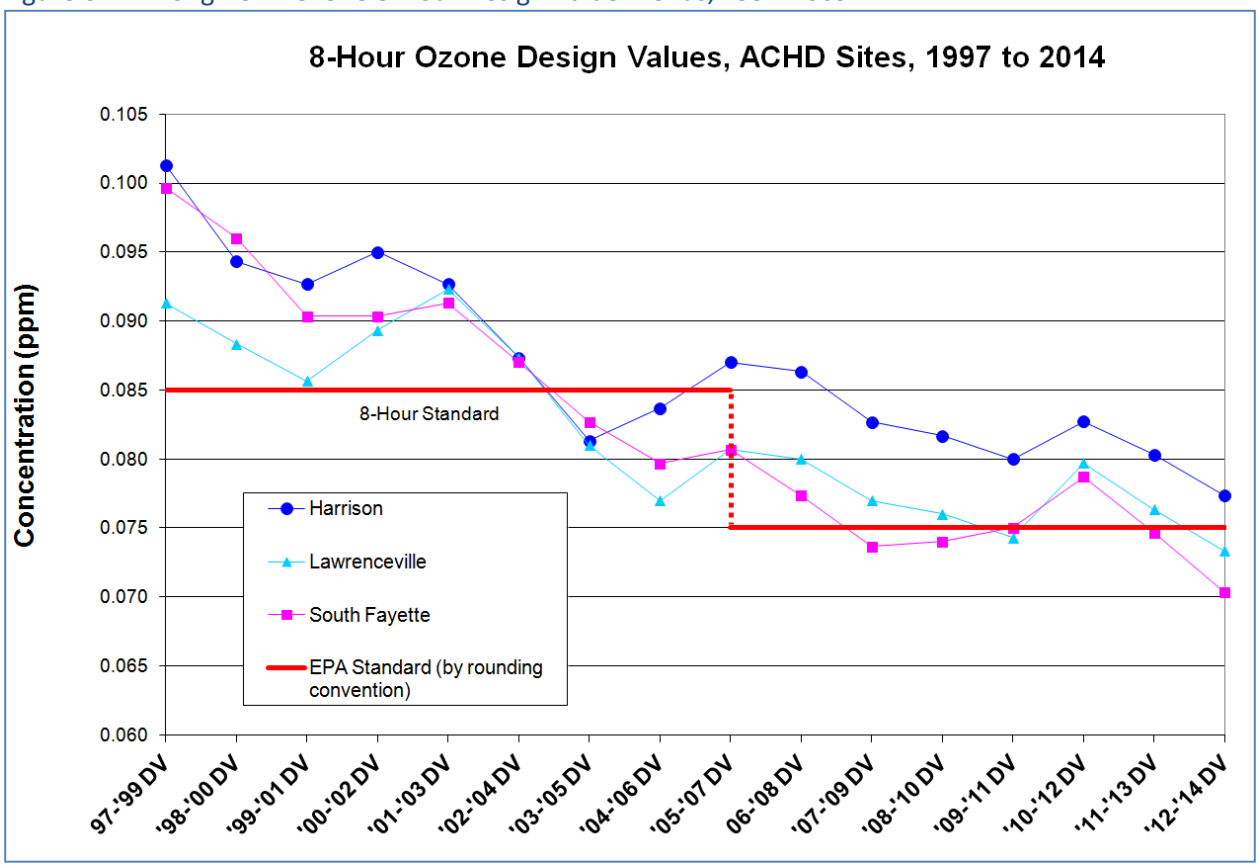
6.5. New Sites

No new ozone sites are planned for the next five years. Adding a monitor to an established station would not serve to find the highest concentration of ozone. Creating a new station to monitor ozone would not be an efficient use of resources.

6.6. Monitoring Data Trends

Figure 6-11 below displays long-term monitoring trends for ozone in Allegheny County.

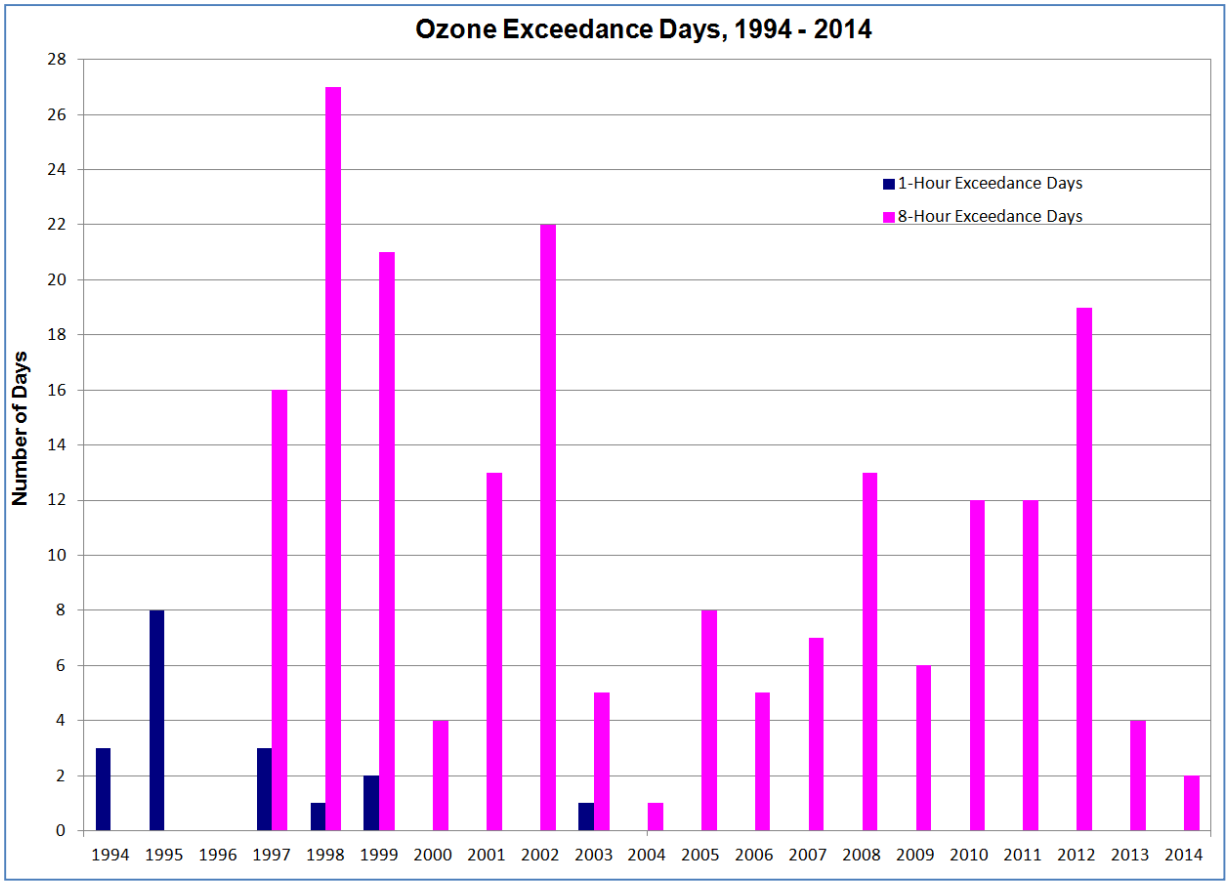
Figure 6-11. Long-Term Ozone 8-Hour Design Value Trends, 1997-2009



Harrison is the only site in Allegheny County's network that still exceeds the 8 hour standard of 0.075 ppm.

Figure 6-12 displays 8-hour ozone exceedance days for the past 10 years. In recent years, there have been fewer exceedance days. Meteorological conditions have helped to limit the number of exceedances in the past two years.

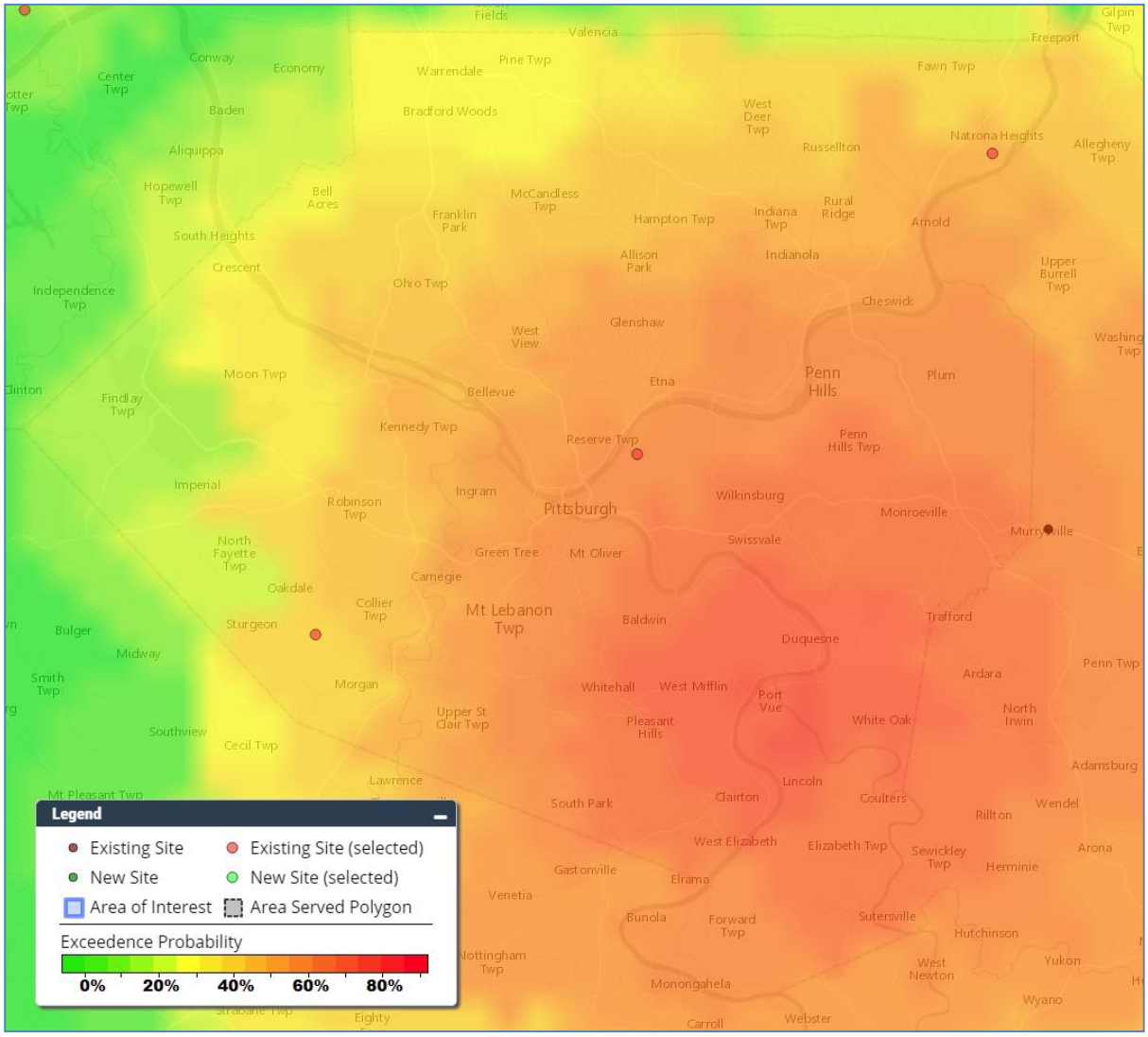
Figure 6-12. 8-Hour Ozone Exceedance Days, 1994-2014 (ACHD Sites)



6.7. Exceedance Probability

Figure 6-13 below displays the ozone exceedance probability created by the NetAssess app. This creates a map by using a spatial distribution of the highest concentrations at each monitor to estimate other areas where extreme concentrations may occur. Harrison has the highest concentrations in the county.

Figure 6-13. Ozone Exceedance Probability for Allegheny County



6.8. Rankings

Table 6-3 below shows the ranking values and score/rank for each ozone monitor in Allegheny County (operated by ACHD) based on the ranking methodology.

Table 6-3. Ozone Rankings

Ozone Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 8-Hour Design Value (ppm)	Site Objectives	Population Served Density (pop./mi²)	Closest Site (km)
Lawrenceville	4	37	0.073	Population Exposure	2350	20
South Fayette	3	35	0.070	Background/ Transport	1089	20
Harrison	2	25	0.077	Population Exposure	513	25

Ozone Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 8-Hour Design Value	Site Objectives	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Lawrenceville	1.00	1.00	1.02	1.0	0.75	0.75	1.0	6.52	**1**
South Fayette	0.75	1.00	0.98	1.0	0.50	0.75	1.0	5.98	**2**
Harrison	0.50	0.75	1.08	1.0	0.25	1.00	1.0	5.58	**3**

Lawrenceville shows the highest ranking based on population exposure and number of other pollutants. Harrison, while showing the highest design value, scores lower due to population served density and years of operation. Overall, all sites are important for the ozone network, with locations upwind, downwind, and within the City of Pittsburgh.

6.9. Summary

Allegheny County's ozone network provides sufficient coverage for the county. South Fayette provides regional transport surveillance, Lawrenceville provides urban coverage while Harrison monitors ozone as it leaves the county. ACHD's network supports the larger ozone network operated by PA DEP in the Pittsburgh-Beaver Valley nonattainment area.

Depending on the promulgation and level of the new ozone standard, the Lawrenceville monitoring station, which is currently part of the NCore multi-pollutant monitoring network, may be required to upgrade to a PAMS (Photochemical Assessment Monitoring Station) site. Some of the additional requirements of PAMS are operation a continuous gas chromatograph, enhanced hydrocarbon and carbonyl sampling, and surface and upper air meteorology. This would occur after the final rule and designations. It could be years before these required parameters are deployed in the field.

7. PM_{10} Analysis

7.1. Area Served

The area served polygons for PM_{10} are in Figure 7-1 below. The PM_{10} network has adequate coverage across the county. There is more dense surveillance in the Liberty-Clairton area due to it having previously being a nonattainment area. The area and population served by PM_{10} network varies from 2080 miles ^{2} and 554,215 people at the Monroeville site to 21 miles ^{2} and 47,992 people at the Liberty site. The full set of area served demographics are displayed in Table 7-1 on the following page.

Figure 7-1. PM_{10} Area Served Polygons for Allegheny County

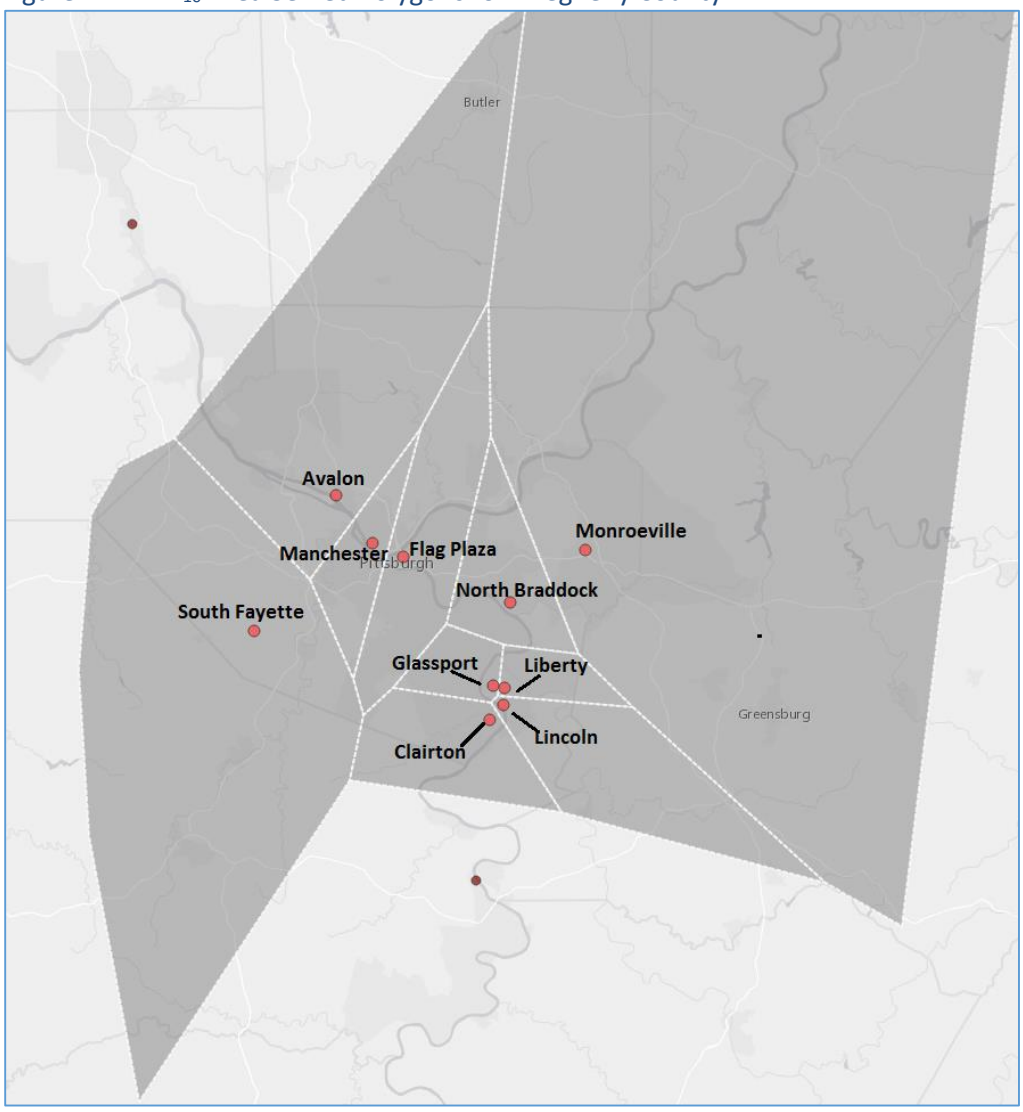
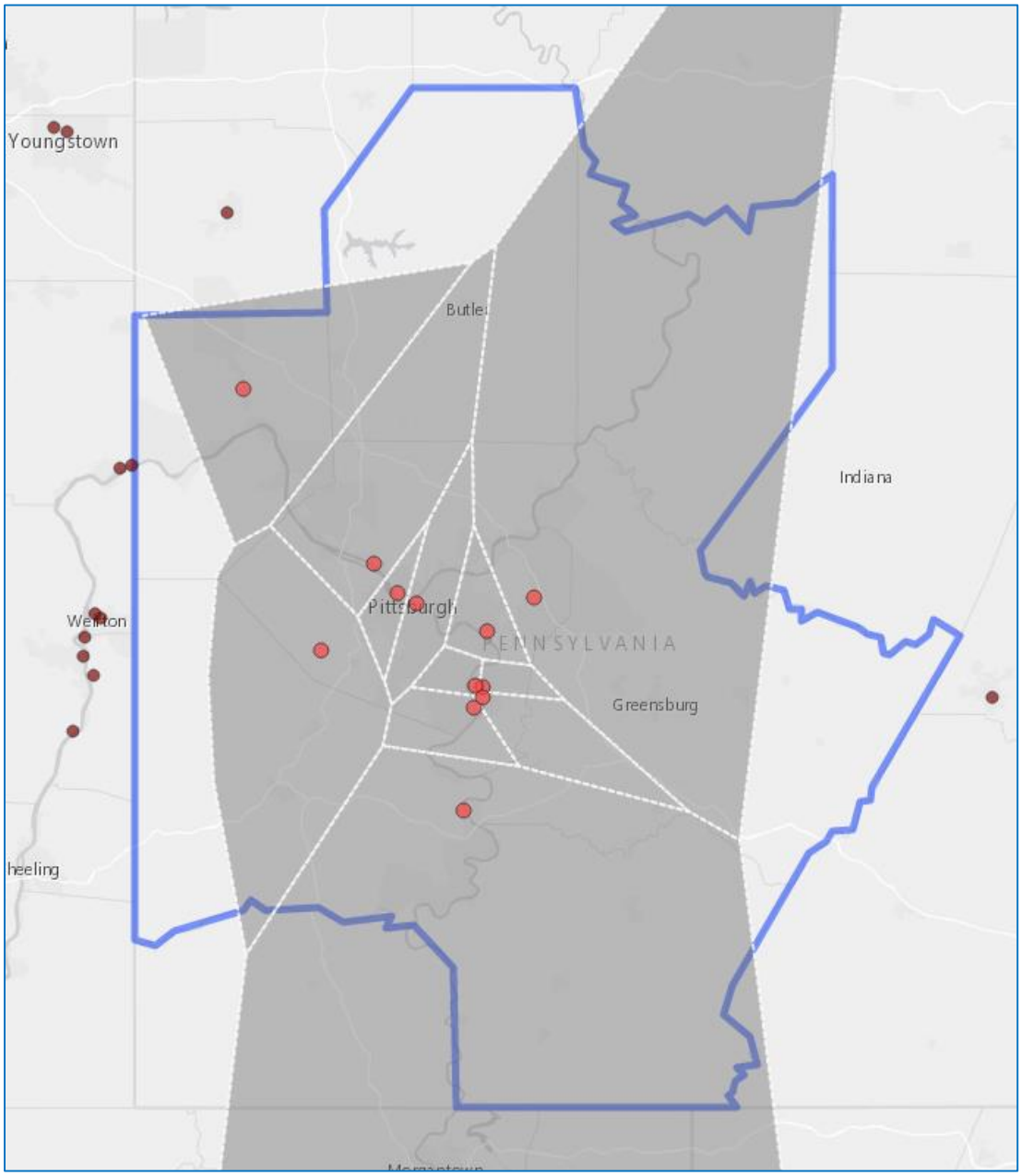


Table 7-1. Area Served Demographics for PM_{10}

AQS ID	Site Name	Total Population	Area - Miles²
42-003-1301	North Braddock	174,942	55
42-003-0064	Liberty	47,992	21
42-003-3007	Clairton	49,629	65
42-003-0031	Flag Plaza	33,960	94
42-003-0067	South Fayette	228,902	466
42-003-0002	Avalon	281,335	325
42-003-0003	Monroeville	554,215	2,080
42-003-3006	Glassport	30,083	22
42-003-7004	Lincoln	36,771	98
42-003-0092	Manchester	135,961	35

The area served polygons for southwestern Pennsylvania are displayed in Figure 7-2 on the following page, with the blue polygon highlighting the Pittsburgh, PA CBSA. PA DEP operates an additional two PM_{10} monitors in this area.

Figure 7-2. PM_{10} Area Served Polygons for Southwestern Pennsylvania



Demographics for Flag Plaza, Liberty, North Braddock, and South Fayette are displayed on the following pages. Information provided are age, sex and race.

Figure 7-3. Flag Plaza Area Served Demographics

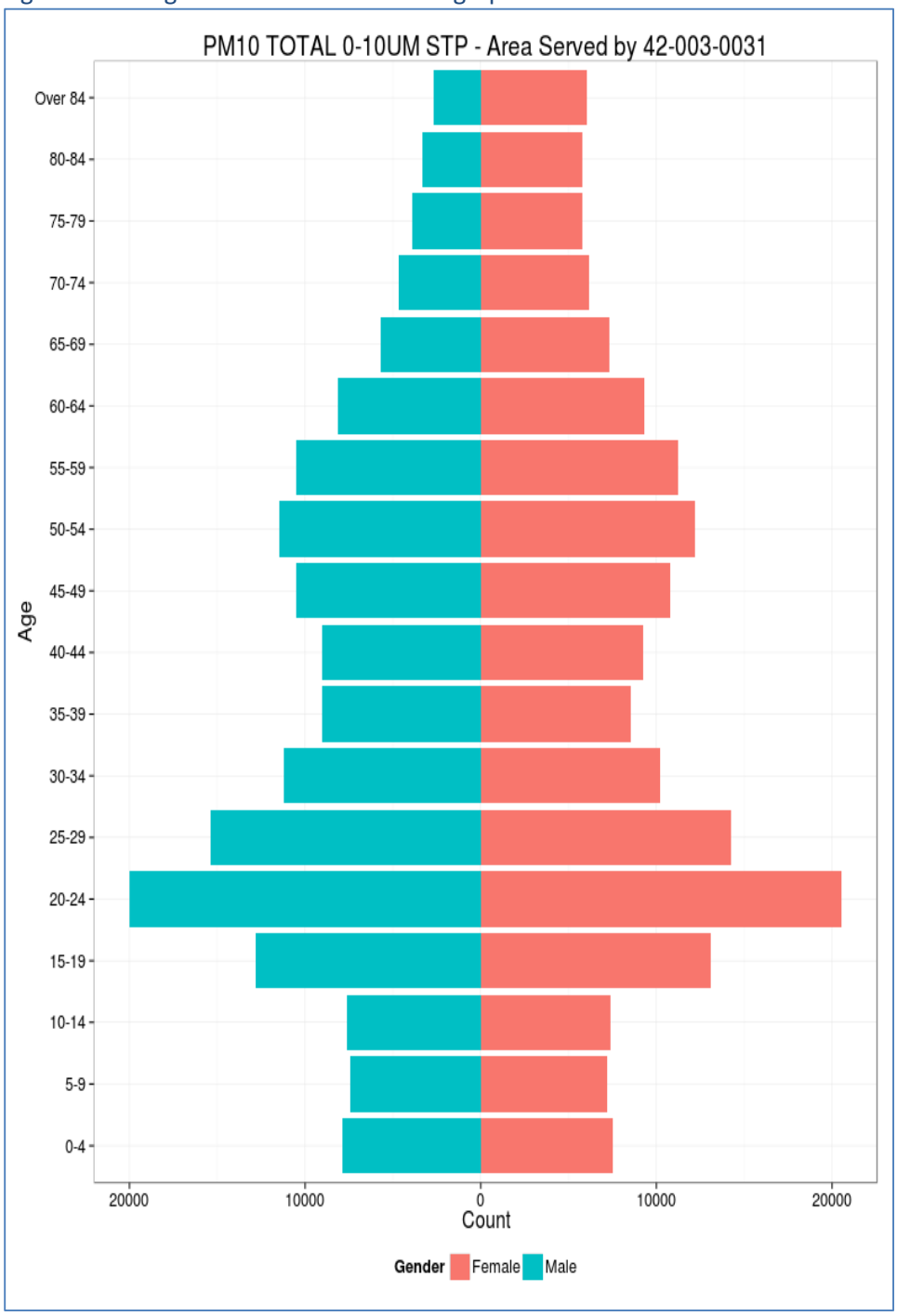
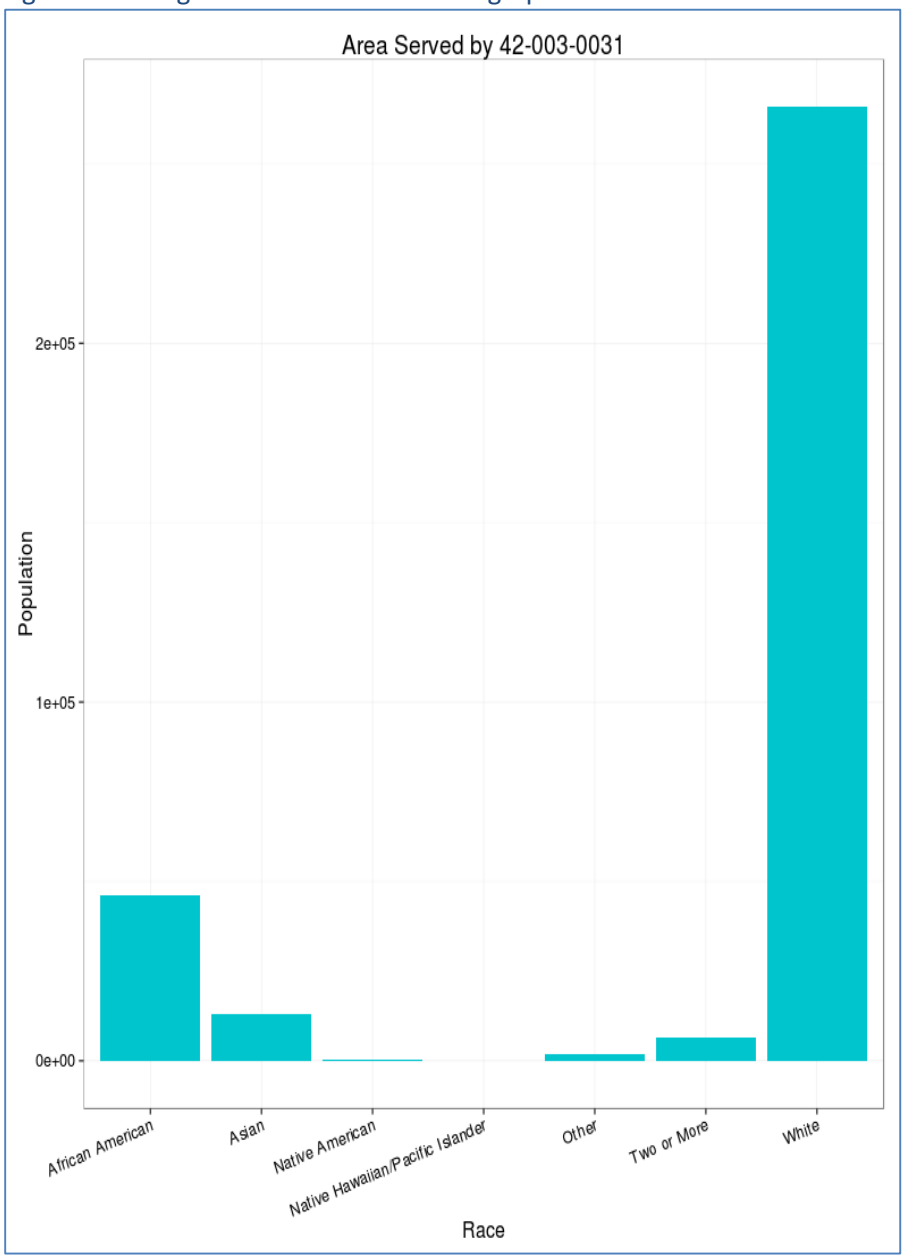


Figure 7-4. Flag Plaza Area Served Demographics



The area served by the Flag Plaza monitor is atypical of the other monitors in the county. It serves a large portion of people between 20 and 30 and less older individuals. Although these are normally are not high risk individuals, the downtown area is an important place to have particulate matter surveillance. It is recommended that particulate monitoring should continue in the downtown area, regardless of particle size. The previous network assessment called for discontinuing PM_{10} at Flag Plaza.

Figure 7-5. Area Served Demographics for Liberty (42-003-0064)

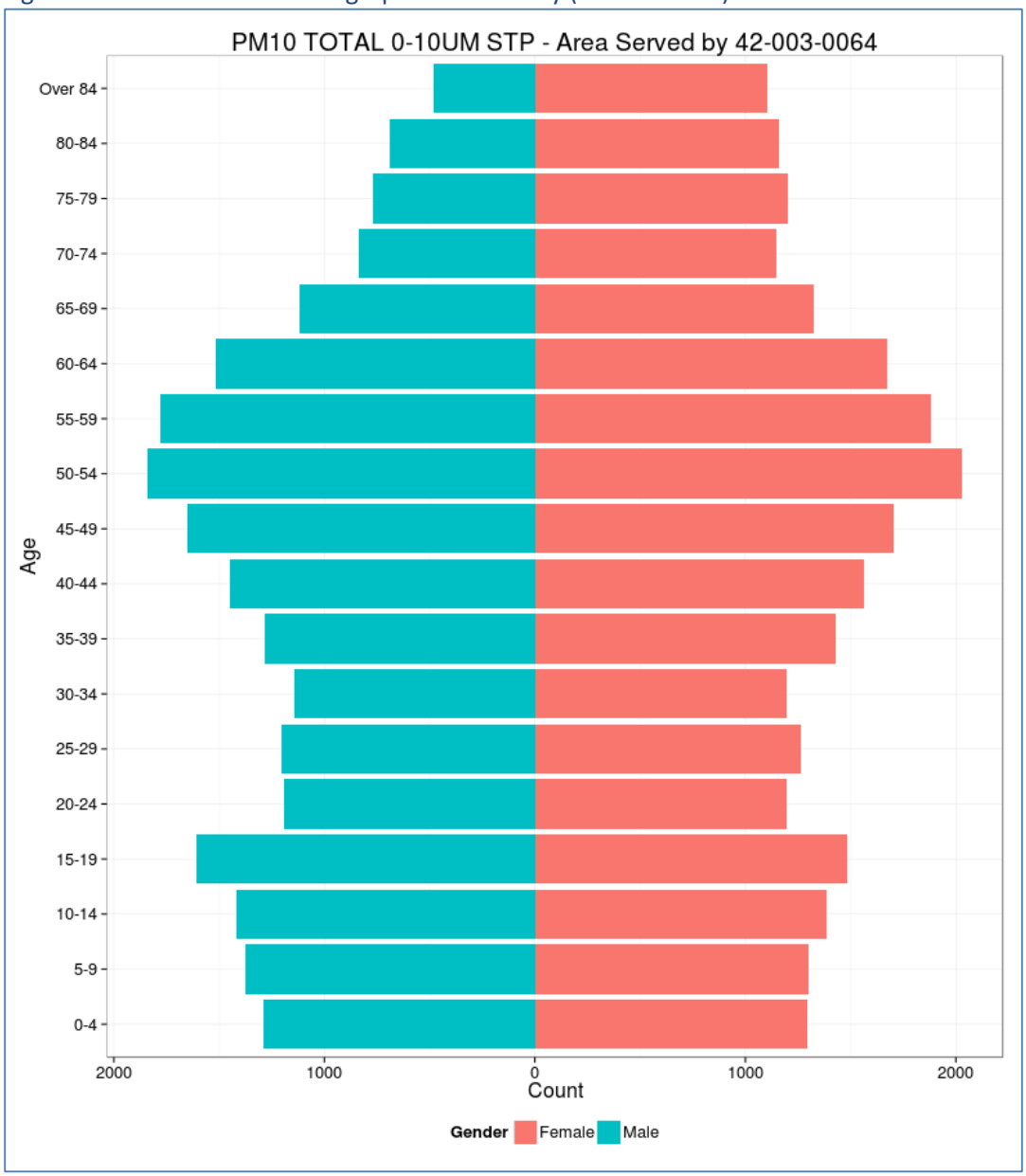
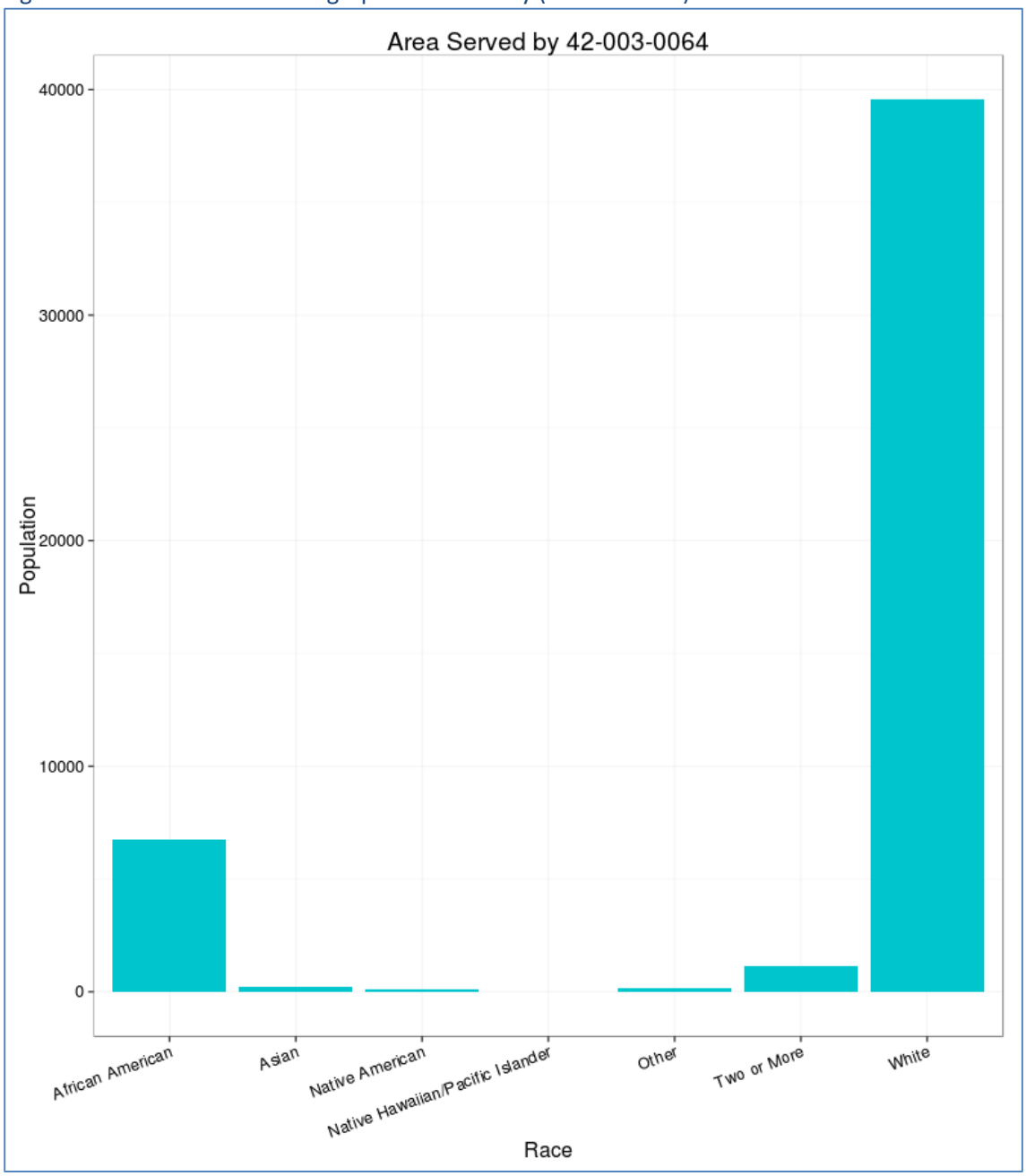
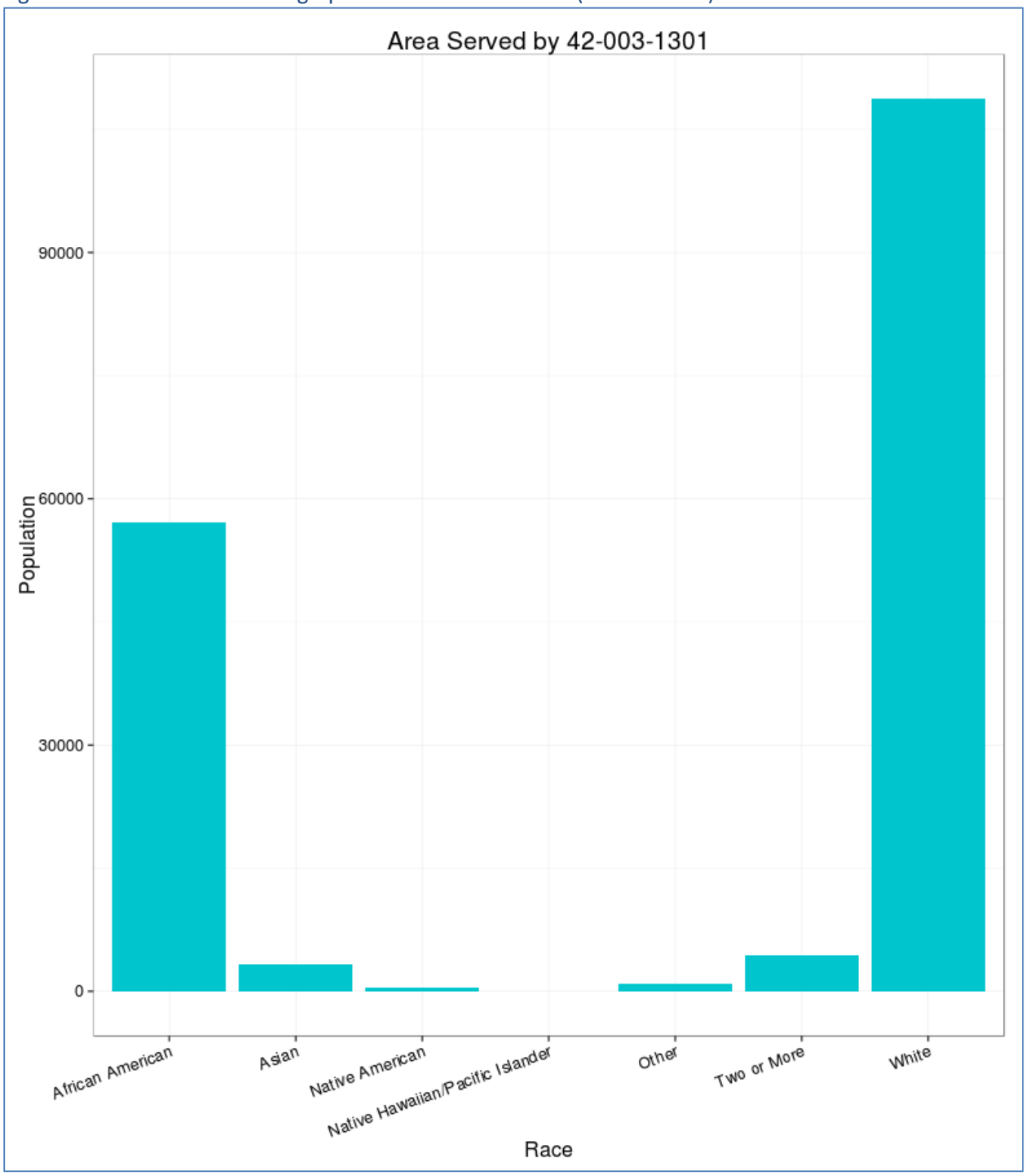


Figure 7-6. Area Served Demographics for Liberty (42-003-0064)



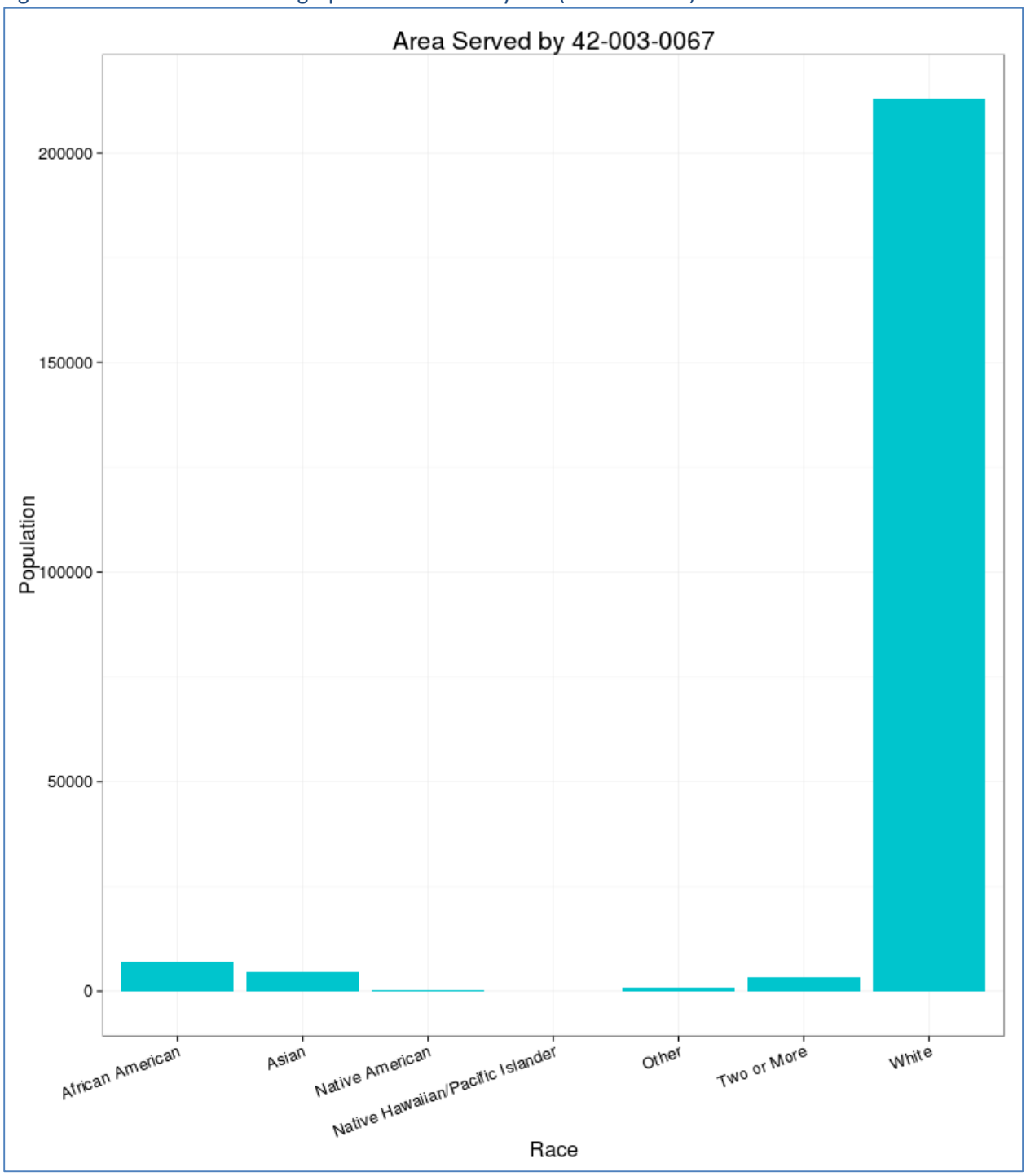
The population demographics for Liberty are similar to the other monitoring sites.

Figure 7-7. Area Served Demographics for North Braddock (42-003-1301)



The three PM_{10} monitors at North Braddock serve the most ethnically diverse population.

Figure 7-8. Area Served Demographics for South Fayette (42-003-0067)

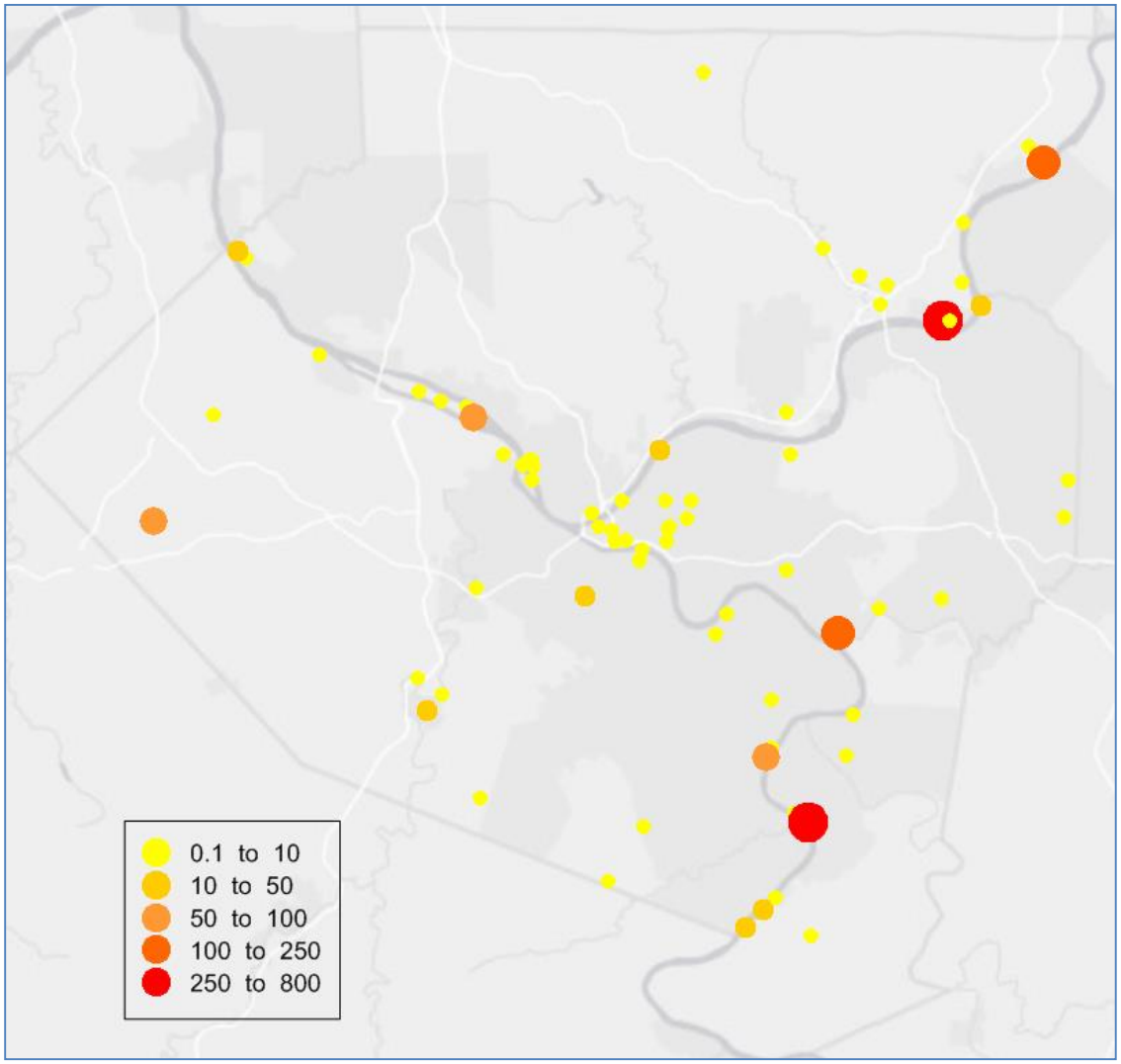


The South Fayette PM_{10} monitor serves a homogenous population but it has additional value as a background monitor. It also represents regionally transported PM_{10}.

7.2. Emissions

Figure 7-9 shows point source direct PM_{10} emissions for Allegheny County sources, based on the 2012 emissions inventory.

Figure 7-9. Direct PM_{10} Point Source Emissions, 2012 (tons actual)



The direct PM_{10} sources are similar to the $PM_{2.5}$ sources (Section 4 above). PM_{10} includes $PM_{2.5}$ and larger fractions of PM.

7.3. Correlations

Table 7-3 below display the relative difference along with the five-year average from 2010 to 2014 between sites across Allegheny County's PM_{10} network. The North Braddock and Monroeville monitors were started in 2011 and only contain data for 2011-2014. This data set contains both continuous and filter based monitors. The continuous monitors are either TEOMs or BAMs. The highest concentration sites at Lincoln, North Braddock, and Liberty do not correlate well with the background site of South Fayette. Monroeville's low concentrations are one of the factors that supports discontinuing this monitor. Flag Plaza also has low concentrations which supports the recommendation that it be replaced with a $PM_{2.5}$ monitor. The other lower concentration sites at Glassport and Clairton help to characterize particulate matter in the Liberty-Clairton $PM_{2.5}$ nonattainment area. Manchester has lower concentrations but would be a candidate for a continuous monitor. This would be an additional opportunity to survey urban particulates in the City of Pittsburgh.

Table 7-3 Relative Difference Across ACHD's PM_{10} Network

PM10 µg/m³	Lincoln	N. Braddock (HV)	N. Braddock (BAM)	Liberty	Avalon	Manchester	Glassport	Flag Plaza	Clairton	Monroeville	South Fayette
5 Year Average	24.60	23.65	23.04	21.98	18.88	18.38	17.86	17.70	16.00	15.10	13.90
N. Braddock (HV)	0.00										
N. Braddock (BAM)	0.01	0.00									
Liberty	0.01	0.01	0.00								
Avalon	0.02	0.02	0.02	0.01							
Manchester	0.03	0.02	0.02	0.02	0.01						
Glassport	0.03	0.03	0.03	0.02	0.01	0.00					
Flag Plaza	0.03	0.03	0.03	0.02	0.02	0.00	0.00				
Clairton	0.04	0.04	0.04	0.03	0.03	0.02	0.01	0.01			
Monroeville	0.05	0.05	0.05	0.04	0.04	0.02	0.02	0.02	0.01		
South Fayette	0.06	0.06	0.06	0.05	0.00	0.04	0.03	0.03	0.02	0.01	

Note that North Braddock BAM and Monroeville averages contain data from 2011-2014

7.4. Removal Bias

The Monroeville PM_{10} monitor will be discontinued upon installation of a $PM_{2.5}$ monitor at the Parkway East Near-Road station. The Monroeville monitor was intended to capture roadway emission pending the installation of the Near-Road site. Concentrations were low and did not reflect roadway emissions. Since the PM_{10} standard has been revoked, there is much more interest in $PM_{2.5}$. Flag Plaza would be better served by a $PM_{2.5}$ monitor in place of the PM_{10} monitor. Flag Plaza has low PM_{10} concentrations and is not likely to violate any of the former PM_{10} standards. A particulate matter monitor in the Pittsburgh Central Business District (CBD) area is recommended, regardless of particle size.

B(a)P concentrations are digested from high volume filters at Liberty, Avalon, and South Fayette from the 1 in 6 day samples. B(a)P has been collected for many years and will continue to be monitored, therefore high volume sampling at Liberty, Avalon, and South Fayette will continue with the current technology.

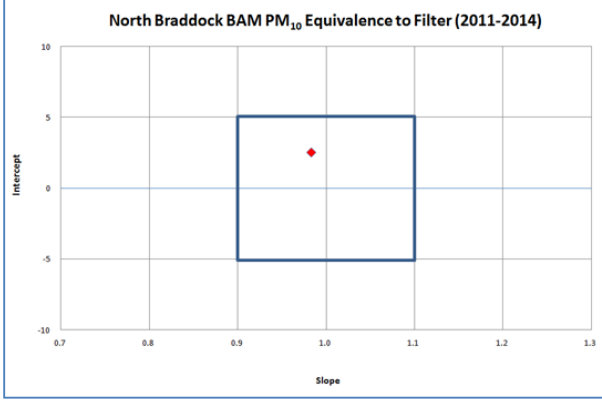
North Braddock currently operates three PM_{10} samplers: a collocated pair of high-volume filter-based samplers and a Beta Attenuation Monitor (BAM). The BAM sampler began sampling on 2011, and correlation with the primary sampler is good. Figure 7-10 on the following page displays high-volume filter-based samples paired with BAM 24-hour averages. A goal with placing the continuous sampler at North Braddock was to provide comparable data to the high-volume samplers, allowing for discontinuation of the high volume monitors. This newer technology additionally provides many more data points (e.g., instead of 5-6 samples per month, there are 24 hourly concentrations and a 24 hour average for each day.)

Figure 7-10. Equivalence Results of BAM Compared to High-Volume, North Braddock PM_{10}, 2011-2014

North Braddock PM10 Correlation: Filter vs. BAM

(Data for 2011-2014)

EPA Regression Test	Slope	Intercept	Correlation R
North Braddock PM10	0.983	2.531	0.937
Upper Limit	1.100	5.000	--
Lower Limit	0.900	-5.000	0.970
Test Results	PASS	PASS	FAIL



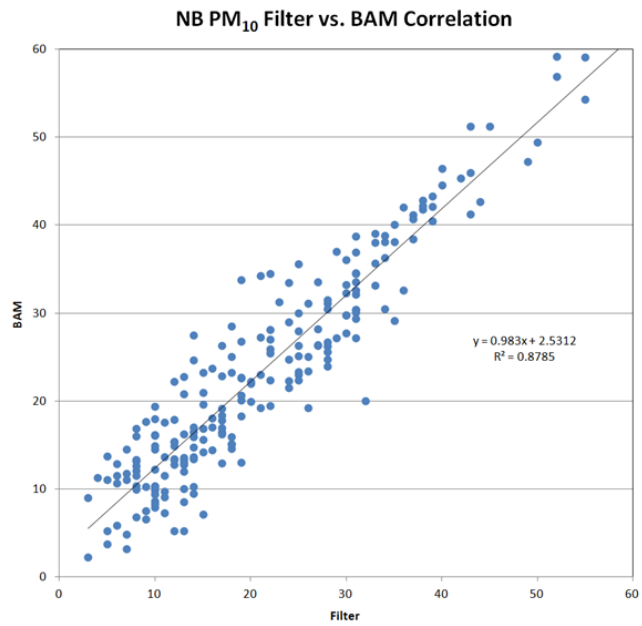


Figure 7-10 shows that the BAM passes regression tests for slope and intercept for PM_{10}. There is also strong time-paired correlation between the methods, although slightly below the recommended value. Overall, the equivalence tests show that the BAM is appropriate as a replacement for the high-volume filter-based monitor at North Braddock.

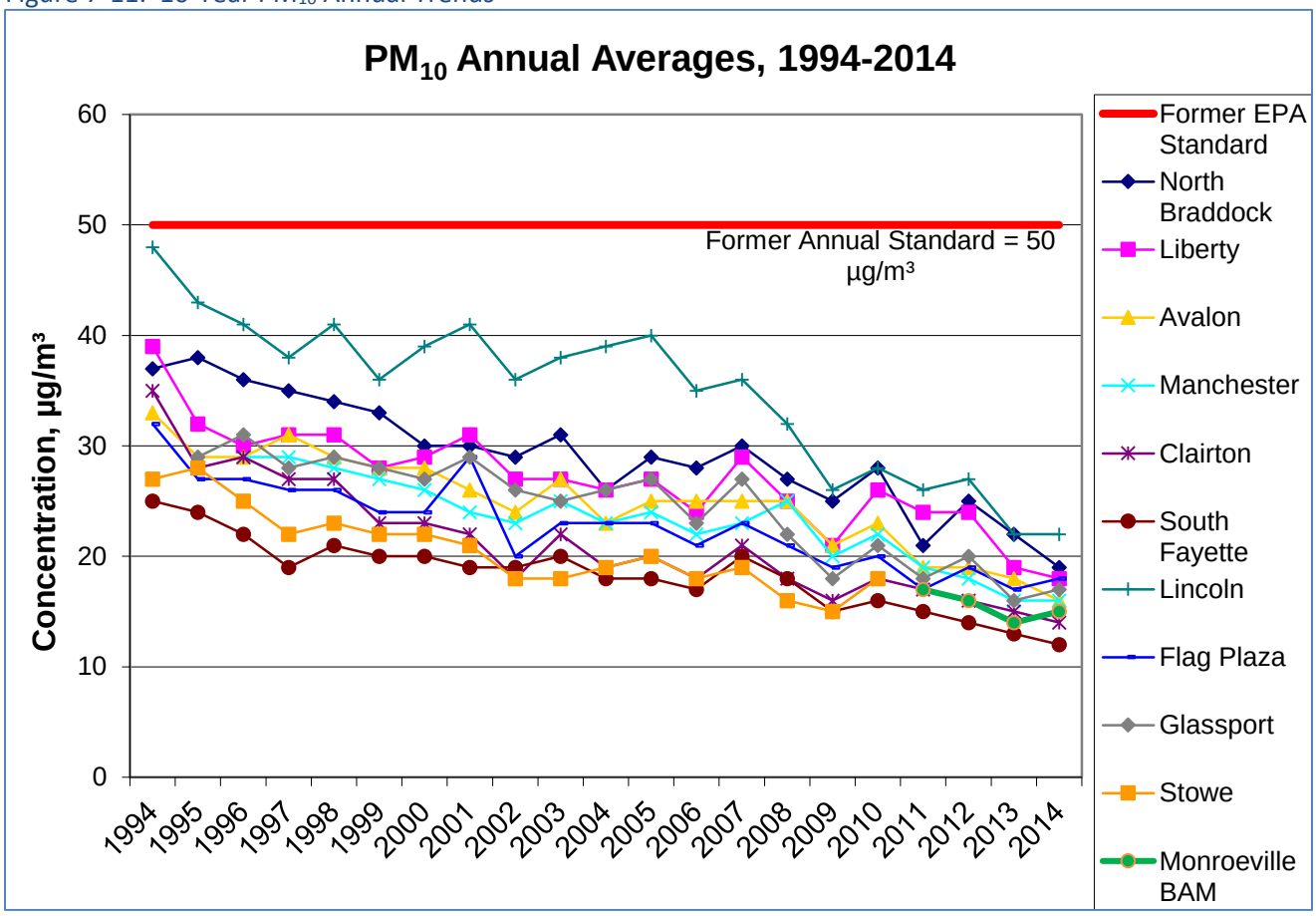
7.5. New Sites and Technology

No new sites for PM_{10} are planned. Exposure to $PM_{2.5}$ is currently a greater health concern. Updating technology is being considered. Replacing manual methods with continuous methods would increase sampling frequency and provide more usable real time data. Manchester is a strong candidate for a continuous monitor. It is another urban site which would provide neighborhood surveillance. Clairton is an additional site that has room for improvement. It currently operates manual methods for PM_{10} and $PM_{2.5}$. Although annual concentrations are low, this additional surveillance in the Liberty Clairton $PM_{2.5}$ Nonattainment Area could provide great value to serving the population.

7.6. Data Trends

Figure 7-11 displays the PM_{10} annual averages from 1994 to 2014.

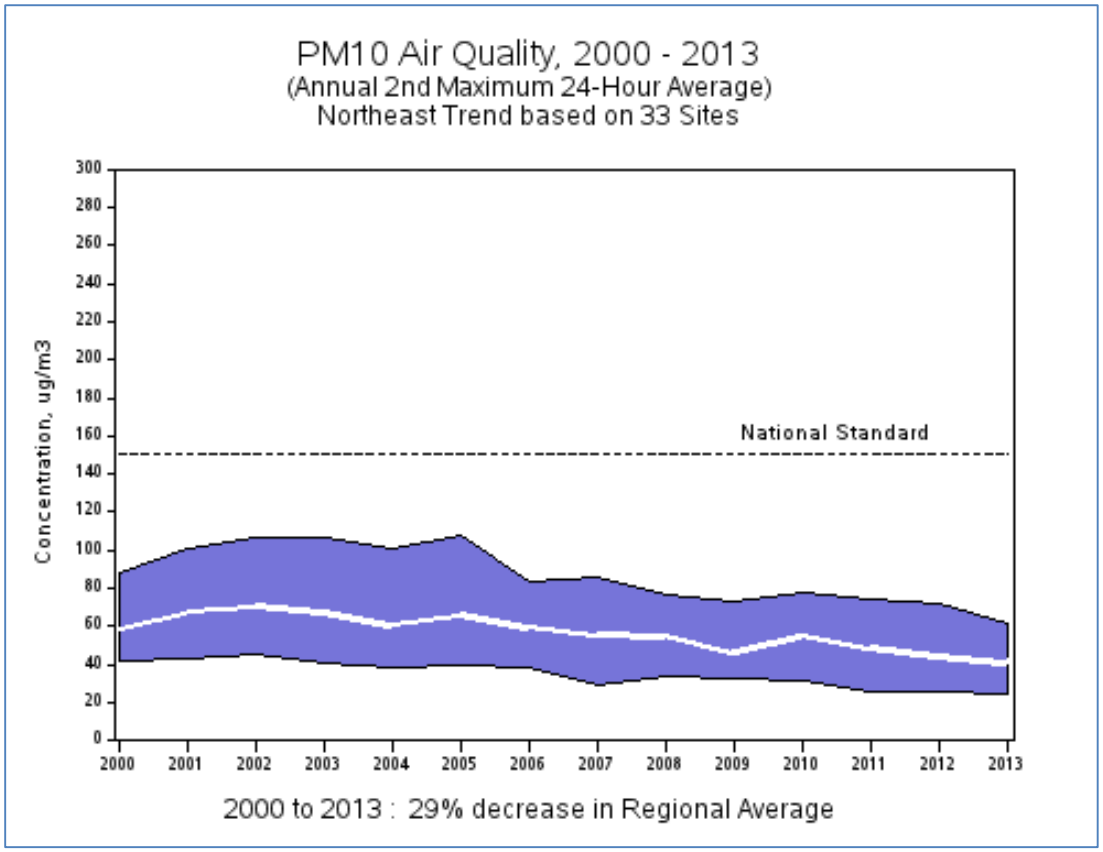
Figure 7-11. 10-Year PM_{10} Annual Trends



PM_{10} concentrations have been steadily declining. The last exceedance of the 24 hour standard of 150 µg/m³ was in 2005 at the Lincoln station.

Figure 7-12 below displays the PM_{10} trends in the Northeastern United States.[5] Concentrations have been decreasing for the past decade.

Figure 7-12. National PM_{10} Trends



[5] http://www.epa.gov/airtrends/pm.html

7.7. Rankings

Table 7-2 below provides the scoring and ranking data for the PM_{10} sites.

Table 7-2. PM_{10} Rankings

PM10 Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2014 24-Hour Max (µg/m³)	Site Objective	Population Served Density (pop./mi²)	Closest Site (km)	Notes
Liberty	2	28	64	Population Exposure	2261	1	Multiple types, also PM2.5
North Braddock	2	27	64	Population Exposure	3192	9	Multiple types, also PM2.5
Flag Plaza	1	29	46	Population Exposure	3546	3	
Glassport	0	24	64	Population Exposure	1367	1	
Manchester	0	26	55	Population Exposure	3871	3	
Avalon	2	28	46	Population Exposure	866	6	Also PM2.5
South Fayette	3	28	22	Background	492	15	Also PM2.5
Clairton	1	23	39	Population Exposure	765	2	Also PM2.5
Lincoln	0	23	70	Highest Concentration	375	2	
Monroeville	0	4	36	Population Exposure	267	9	

PM10 Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2014 24-Hour Max	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Liberty	0.50	0.75	0.85	1.0	0.75	0.00	0.5	4.4	**1**
North Braddock	0.50	0.75	0.85	1.0	1.00	0.25	0.0	4.4	**2**
Flag Plaza	0.25	0.75	0.61	1.0	1.00	0.00	0.0	3.6	**3**
Glassport	0.00	0.75	0.85	1.0	0.50	0.00	0.5	3.6	**4**
Manchester	0.00	0.75	0.73	1.0	1.00	0.00	0.0	3.5	**5**
Avalon	0.50	0.75	0.61	1.0	0.25	0.25	0.0	3.4	**6**
South Fayette	0.75	0.75	0.29	1.0	0.00	0.50	0.0	3.3	**7**
Clairton	0.25	0.75	0.52	1.0	0.25	0.00	0.5	3.3	**8**
Lincoln	0.00	0.75	0.93	1.0	0.00	0.00	0.5	3.2	**9**
Monroeville	0.00	0.00	0.48	1.0	0.00	0.25	0.0	1.7	**10**

Liberty and North Braddock showed the highest importance to the network based on monitored values and population served. Lincoln, despite having the highest monitored maximum, scored second-to-last based on supporting site information. (Lincoln concentrations have also decreased significantly in recent years, indicating that controls from the $PM_{2.5}$ SIP are effective for PM_{10}) Several sites were similar in score (3.3 to 3.6) – one or more of these sites may be redundant to the network. Monroeville is the least important site for PM_{10}, with low monitored values and population served.

7.8. Summary

North Braddock currently operates three PM_{10} monitors, two collocated high volume samplers and a continuous BAM sampler. The continuous monitor provides more usable data in real time. Discontinuing high volume sampling at North Braddock would liberate lab resources for other sample processing. The BAM monitor will still serve this industrial affected area with sampling at a much higher frequency.

The Monroeville monitor is the least important monitor for the network. This site was originally designed to address vehicle emissions from roadways. The Parkway East (Near-Road) $PM_{2.5}$ monitor (once installed) will better address roadway particulate emissions.

New technology could be deployed at Manchester and Clairton after a period of collocation and equivalency testing. Should a $PM_{2.5}$ be deployed at the Flag Plaza site, PM_{10} should be discontinued. It is recommended that particulate matter surveillance continue in the Downtown area.

For the six high volume sampling sites, Allegheny County operates two sets of collocated pairs, although it is required to operate only one set. The collocated pair at Liberty will provide for collocation requirement if high volume sampling at North Braddock ceases.

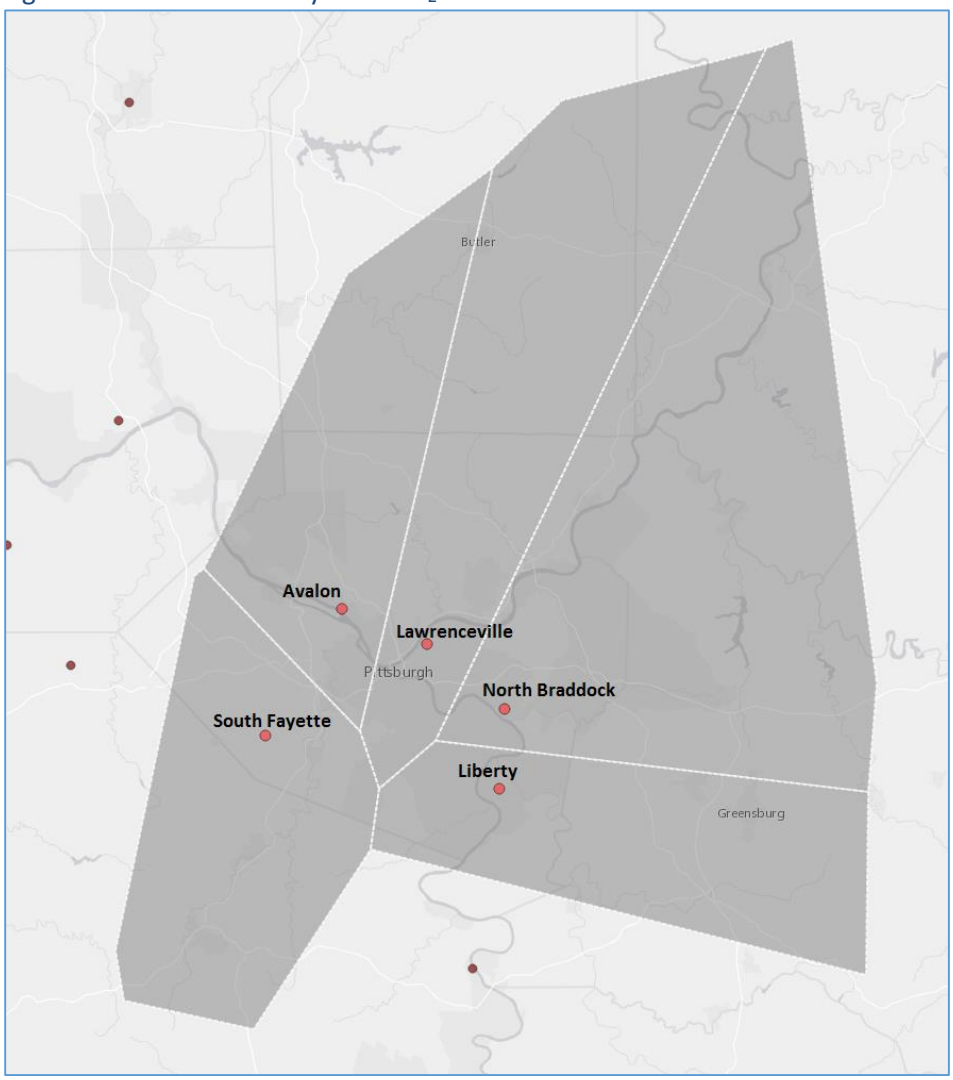
In general, there are limited data users for Allegheny County's PM_{10} network, and in the most vulnerable areas, continuous monitoring would be more appropriate to provide real time data with greater sampling frequency. Historical sites will continue to be monitored. B(a)P is digested from PM_{10} filters at Liberty, Avalon, and South Fayette. Removing some burden from the Allegheny County lab would allow for greater efficiency and reflect the current staffing levels at the lab. The PM_{10} weighing duties place a burden on the $PM_{2.5}$ network. Removing some of this burden would allow the $PM_{2.5}$ network to be more efficient.

8. Sulfur Dioxide (SO_2) Analysis

8.1. Area Served

Area served polygons are displayed below in Figure 8-1. Demographics for each area are displayed in Table 8-1 on the following page. Figure 8-2, also on the following page, displays the area served polygons for the Pittsburgh CBSA. Allegheny County sites are labeled.

Figure 8-1. Area Served by 2014 SO_2 Network

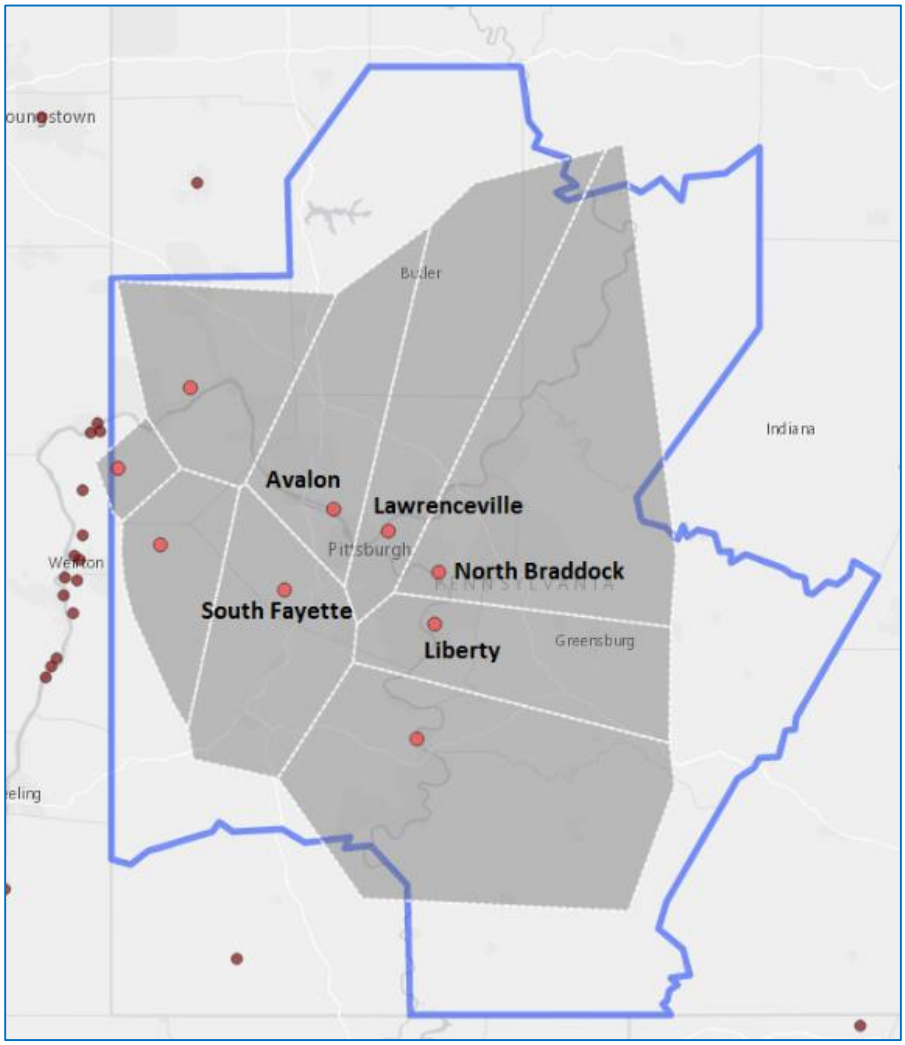


The South Fayette SO_2 monitor measures regional transport and background concentrations. Avalon, North Braddock, and Liberty are near industrial sources. The North Braddock and Liberty monitors are also in the Allegheny SO_2 Nonattainnment Area. The Lawrenceville monitor serves the urban area in the City of Pittsburgh.

Table 8-1. Area Served Demographics

AQS Site ID	Site Name	Total Population	Area- Miles²
42-003-0002	Avalon	330,875	314
42-003-0008	Lawrenceville	487,295	474
42-003-0064	Liberty	258,266	333
42-003-0067	South Fayette	241,820	347
42-003-1301	North Braddock	462,369	807

Figure 8-2. Area Served Polygons for Southwestern Pennsylvania

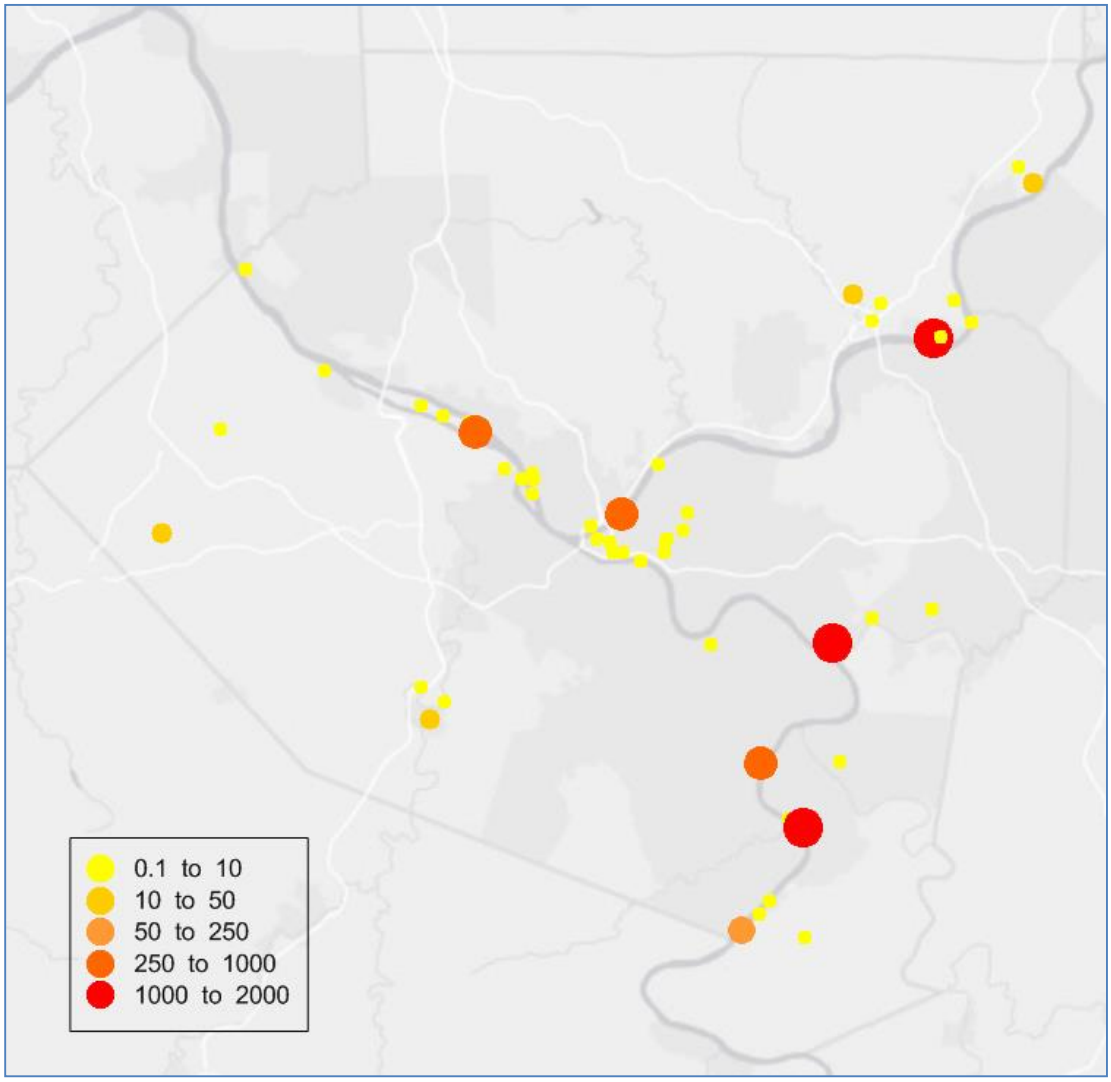


ACHD operates five monitors in the county. PA DEP operates four additional SO_2 monitors in the Pittsburgh CBSA.

8.2. Emissions

Figure 8-3 shows point source SO_2 emissions for Allegheny County sources, based on the 2012 emissions inventory.

Figure 8-3. SO_2 Point Source Emissions, 2012 (tons actual)



While some smaller SO_2 sources are spread throughout the county, the largest emitters are a handful of point sources. The 2010 designations were partially based on these emissions. Monitors sites have also been based on areas with the largest potential concentrations.

8.3. Correlations

Table 8-2 below displays the relative difference and the five-year average of Allegheny County's SO_2 network. North Braddock was started in 2014 and contains data for that year only. Liberty does not correlate well with other sites in the network. Its high concentrations mark it as a unique site. Lawrenceville and Avalon correlate most closely with each other. This correlation does not indicate removal for either site. Lawrenceville operates as part of the NCore network and Avalon serves its objective for population exposure and offers addition industrial surveillance of the Neville Island industrial area. South Fayette continues to monitor the lowest concentrations in the county.

Table 8-2. Relative Difference Across ACHD's SO_2 Network

SO_2 ppm	Liberty	North Braddock	Lawrenceville	Avalon	South Fayette
5 Year Average	5.81	2.87	1.88	1.74	1.51
North Braddock	0.35				
Lawrencevile	0.72	0.37			
Avalon	0.81	0.46	0.09		
South Fayette	0.98	0.63	0.26	0.17	

Note the North Braddock average is data from 2014 only.

8.4. Removal Bias

Allegheny County does not intend to remove any SO_2 monitors in the next five years. South Fayette serves as an indicator of regional transport and background concentrations. North Braddock and Liberty are in the nonattainment area and will continue to be monitored for years to come. Liberty has had exceedance hours each year since the 2010 standard was promulgated. North Braddock has had exceedance hours in 2014 when it began operation. Both monitors will continue to operate in the future. Avalon's objective is population exposure but it also provides surveillance of industrial area of Neville Island. Lawrenceville operates a trace level monitor that provides urban surveillance but is also a requirement of the NCore network and will not be discontinued. Low concentrations at South Fayette, Avalon, and Lawrenceville are not indicators that these sites should be discontinued.

8.5. New Sites and Technology

New sites may be deployed within the current Allegheny, PA SO_2 nonattainment area, pictured in Figure 8-4 below, depending on modeled results. Additionally, depending on the final regulations for the Data Requirements Rule, a new monitor may be required in the northeastern part of the county near the Cheswick power plant. The need for new sites is indeterminable at this time. (See "8.8. Summary" for more information.)

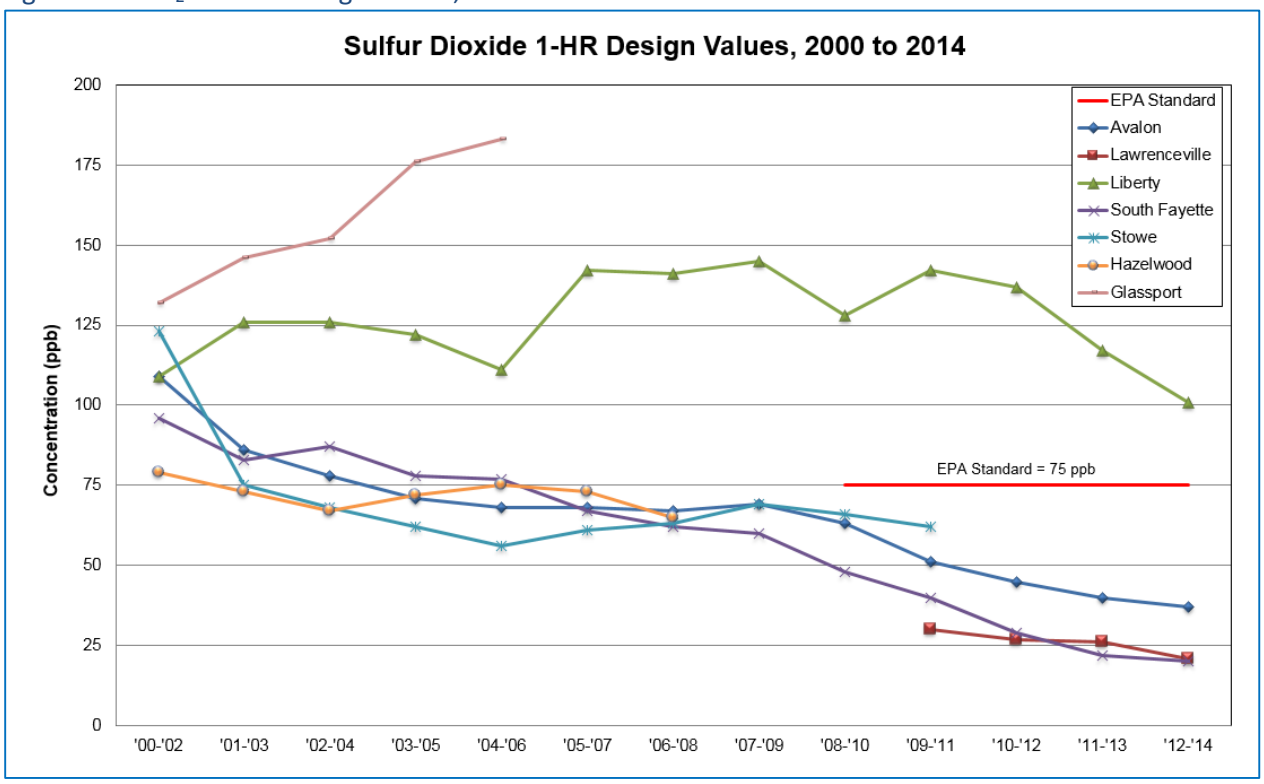
Figure 8-4. Close-Up of SO_2 Nonattainment Area

Determination of possible new locations would include many site-related factors required for ambient monitoring of gaseous monitors. This includes surrounding land use, property determinations, housing/electrical requirements, operator accessibility, etc. Many locations such as heavily-wooded areas or steep hillsides would not make for appropriate locations for SO_2 surveillance.

8.6. Monitoring Data Trends

In 2010, the EPA promulgated the new SO_2 NAAQS 1 hour standard of 75 ppb. The Liberty monitor is not in attainment of this standard. The other currently operating monitors in ACHD's network are below the new standard. The North Braddock SO_2 monitor was restarted in 2014 and is not included in the design value trends.

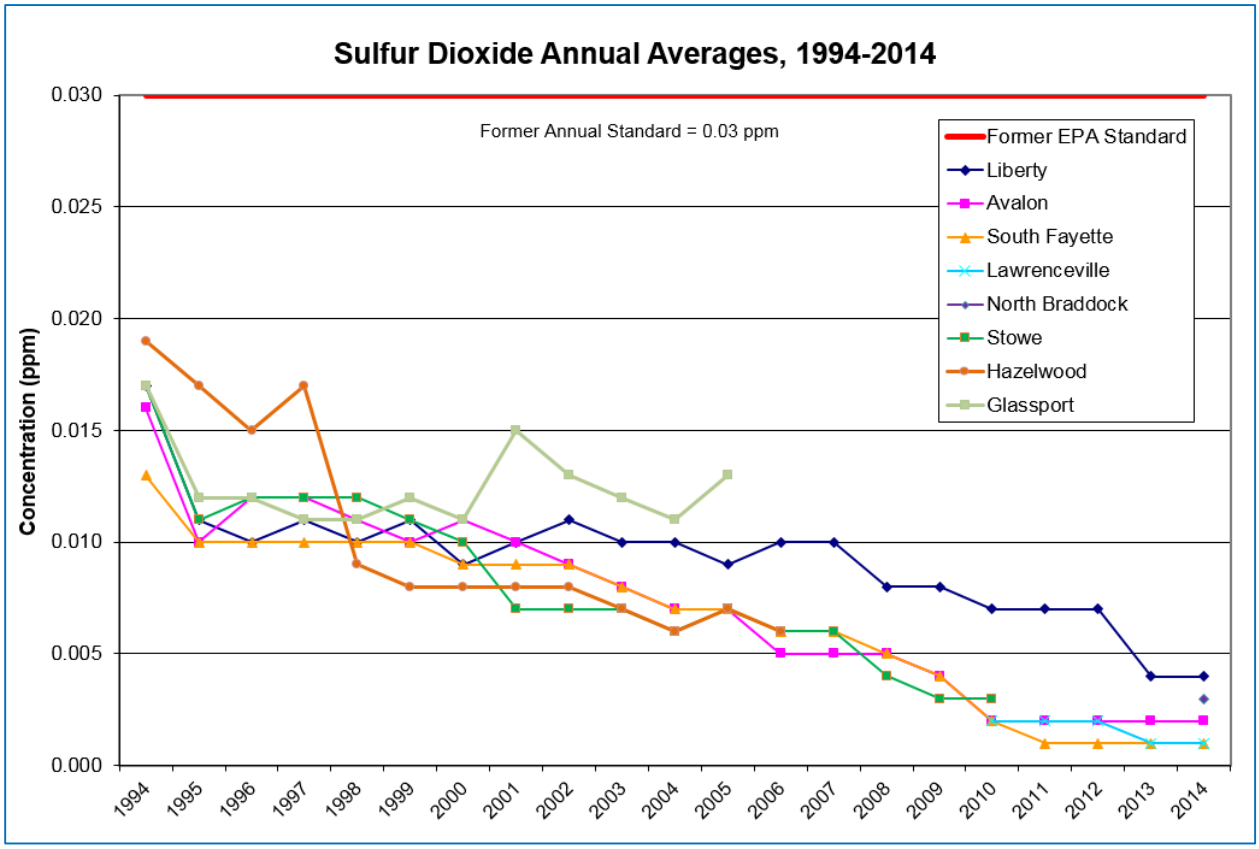
Figure 8-5. SO_2 1- Hour Design Values, 2000-2014



The previous 24-hour standard of 0.14 ppm was last violated in 1999.

Figure 8-6 below displays the long term annual averages across Allegheny County's network. Concentrations have decreased across all sites in the past 10 years. Avalon, South Fayette, and Lawrenceville have had steady, low concentrations for the past four years.

Figure 8-6. Long Term Annual SO_2 Trends



8.7. Rankings

Table 8-1 below shows the scoring and ranking for the SO_2 monitors.

Table 8-1. SO_2 Rankings

Sulfur Dioxide Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 1-Hour Design Value (ppb)	Site Objective	Population Served Density (pop./mi²)	Closest Site (km)	Notes
Liberty	2	46	101	Highest Concentration	775	9	
North Braddock	2	1 (+26)	89	Population Exposure	573	9	Restarted in 2014
South Fayette	3	35	20	Background	697	16	
Avalon	1	35	37	Population Exposure	1056	10	
Lawrenceville	4	5	21	Population Exposure	1028	10	

Sulfur Dioxide Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 1-Hour Design Value	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Liberty	0.50	1.00	2.69	1.0	0.25	0.25	1.0	6.7	**1**
North Braddock	0.50	0.75	2.37	1.0	0.25	0.25	1.0	6.1	**2**
South Fayette	0.75	1.00	0.53	1.0	0.25	0.75	0.0	4.3	**3**
Avalon	0.50	1.00	0.99	1.0	0.50	0.25	0.0	4.2	**4**
Lawrenceville	1.00	0.00	0.56	1.0	0.50	0.25	0.0	3.3	**5**

Liberty and North Braddock showed the highest importance to the network based on design values. The additional sites show importance based on their site characteristics. These 3 sites are also important for background values in relation to the current nonattainment area.

8.8. Summary

Allegheny County's SO_2 network provides dense coverage for the county. The monitors are correctly placed near industrial areas as well as providing urban and regional transport surveillance. Lawrenceville provides urban coverage in Pittsburgh, while South Fayette provides regional transport and rural surveillance. The Avalon monitor measures population exposure but has additional value as source-oriented surveillance of the Neville Island industrial area. The Liberty and North Braddock sites have recorded exceedances of the 1-hour standard and will continue to operate in the future.

The 2010 SO_2 NAAQS outlined procedures to demonstrate attainment of the standard through modeling and/or monitoring. For the currently designated Allegheny, PA nonattainment area, modeling is under development. If attainment can be demonstrated with modeling, no additional monitors will be required. For additional areas identified by the future Data Requirements Rule, either modeling or monitoring may be required.

The need for (or the exact locations) of new monitors cannot be determined at this time. In general, based on preliminary modeled results and current monitor site locations, areas near Liberty and North Braddock may be appropriate. Lincoln is an established site for PM_{10}, and Glassport was a former site for SO_2 (discontinued in 2005). SO_2 monitoring was also located in the Wilson neighborhood of Clairton until 2000.

If the need arises for additional sites outside of the county based on modeled impacts, ACHD will work in conjunction with PA DEP on the appropriateness and placement monitors.

9. Nitrogen Dioxide (NO_2) Analysis

9.1. Area Served

Area served polygons are displayed in Figure 9-1 below. Demographics for each area served are displayed in Table 9-1 on the following page. Figure 9-2 shows the area served polygons for the Pittsburgh, PA CBSA.

Figure 9-1. Area Served by NO_2 Network

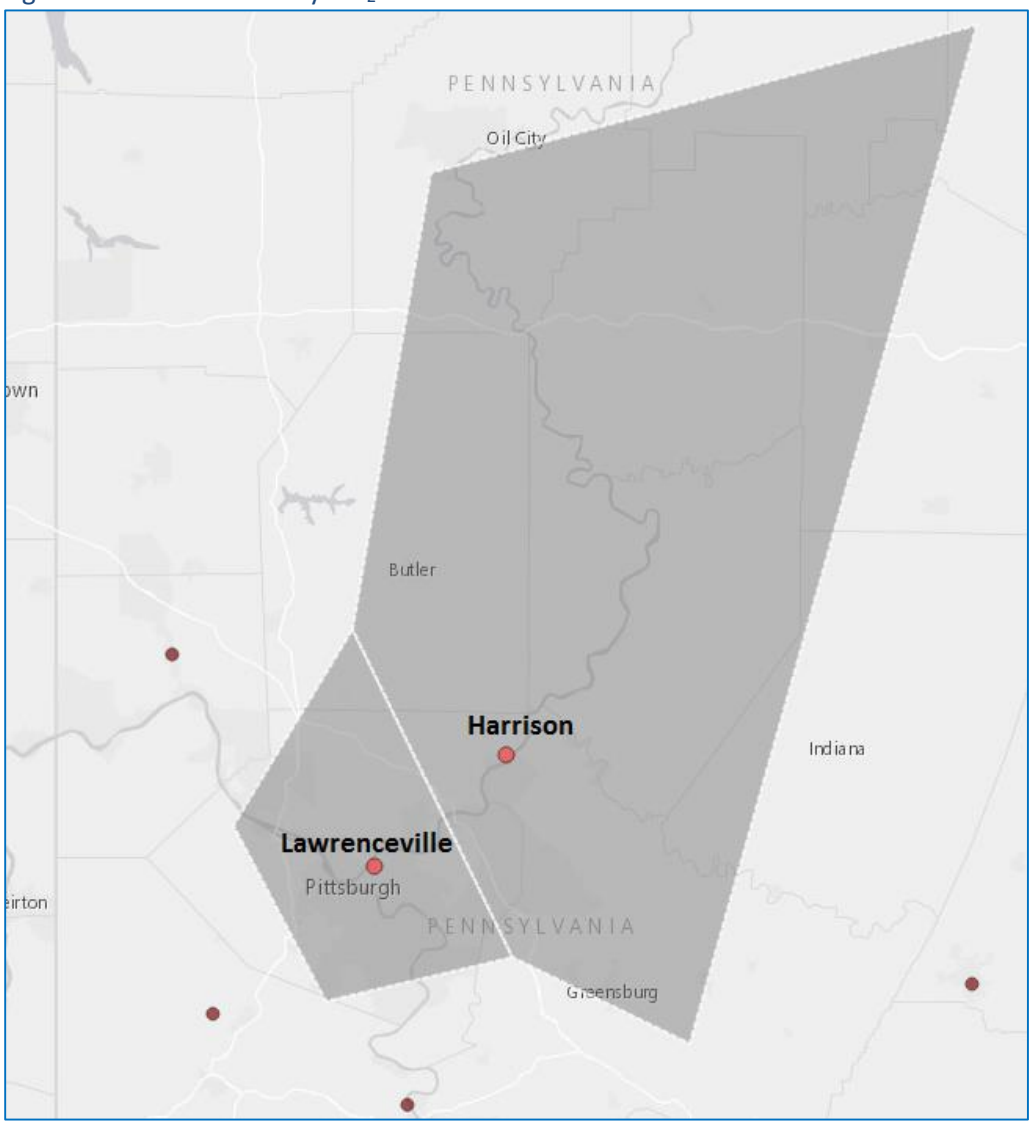
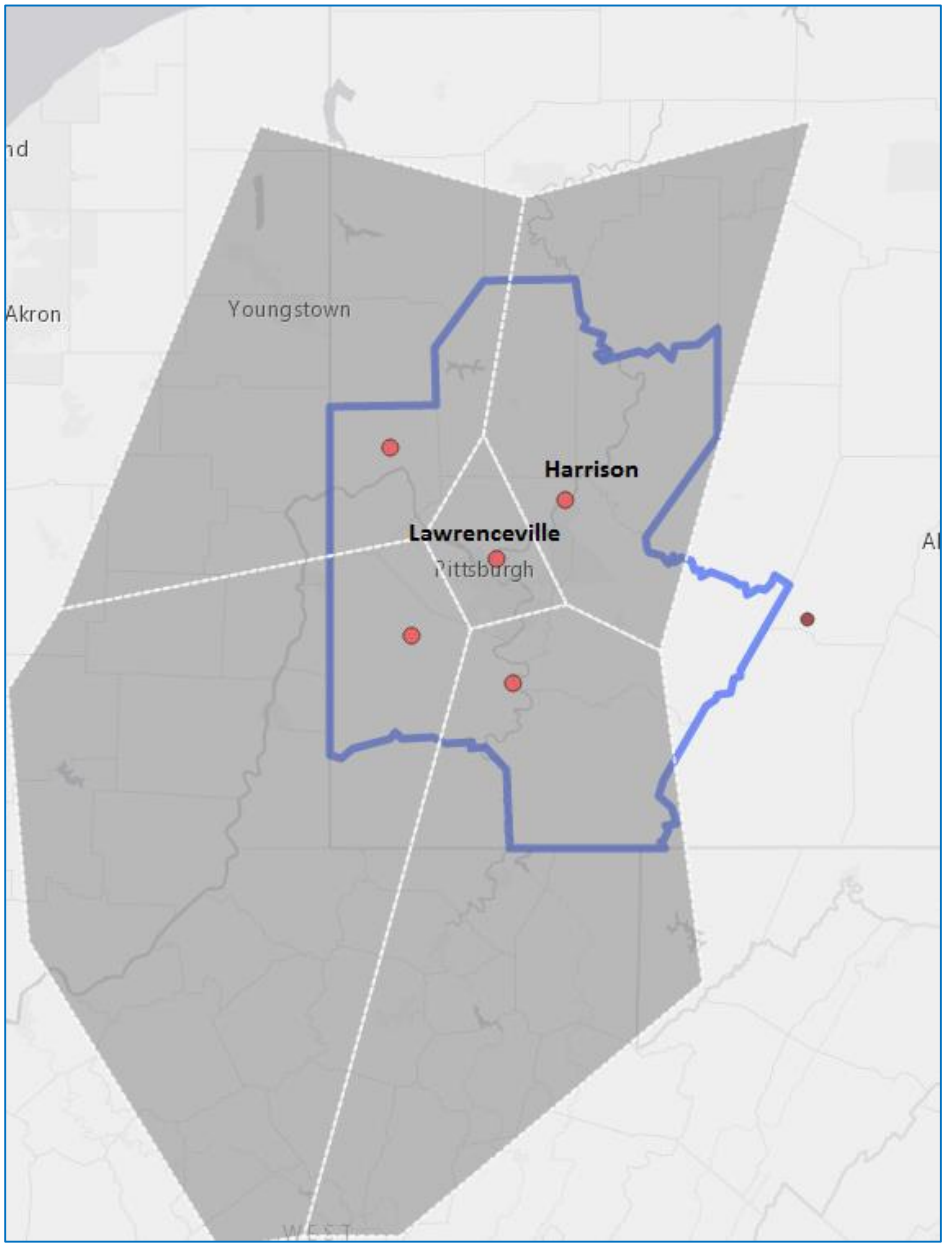


Table 9-1. Area Served Demographics

AQ Site ID	Site Name	Total Population	Area -Miles²
42-003-0008	Lawrenceville	1,006,363	454
42-003-1005	Harrison	555,116	3,100

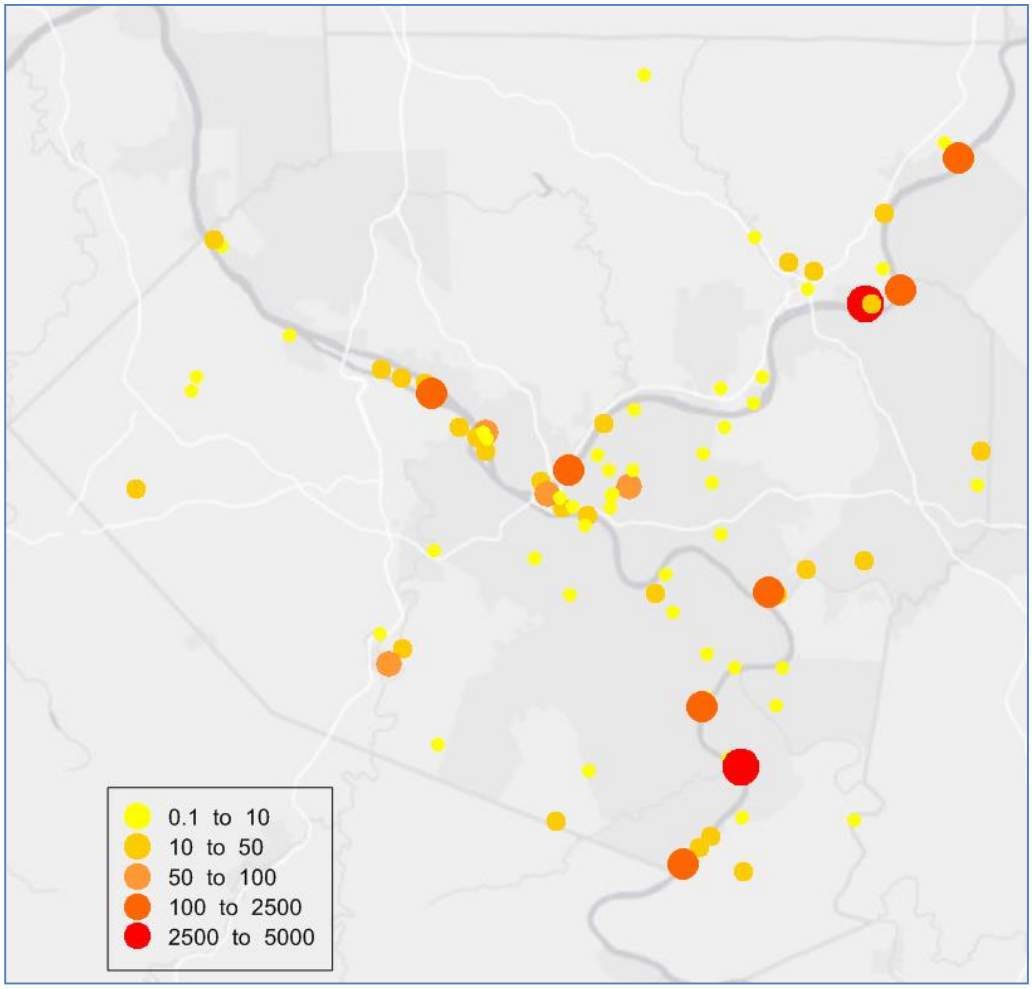
Figure 9-2. Area Served Polygons For Southwestern Pennsylvania



9.2. Emissions

Figure 9-3 shows point source NO_2 emissions for Allegheny County sources, based on the 2012 emissions inventory.

Figure 9-3. NO_2 Point Source Emissions, 2012 (tons actual)



Both small and large sources of NO_2 are scattered throughout the county, with the highest densities in the industrial valleys and urban areas. The point source emissions do not account for mobile source emissions near interstate highways and major local arteries. (See also "Section 14. Emissions Inventory.")

9.3. Correlations

Displayed in Table 9-2 below are the relative differences between monitors for NO_2. The Parkway East, Near-Road NO_2 monitor only contains partial year data for 2014, the other sites display the five-year average. Near-Road has been correlating well with Lawrenceville since it has begun operation. All three sites have low concentrations.

Table 9-2. Relative Differences Across ACHD's NO_2 Network

NO_2 ppb	Lawrenceville	Harrison	Parkway East
5 Year Average	11.01	8.29	12.51
Harrison	0.06		
Near Road	0.02	0.08	

Note the Parkway East (Near-Road) average is partial year 2014.

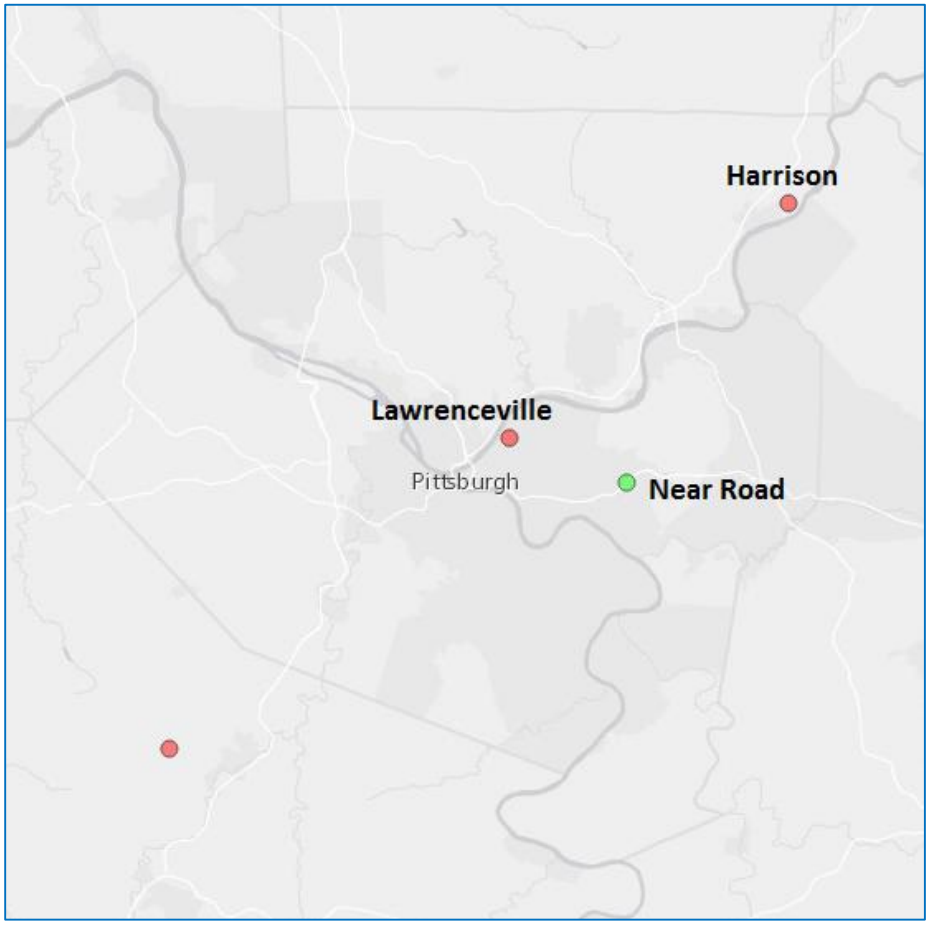
9.4. Removal Bias

ACHD intends to operate its current nitrogen oxides sites for the next five years. Harrison and Parkway East, Near-Road will operate NO_2 monitors and Lawrenceville will operate its trace level NO_y monitor. The recently activated Near-Road monitor will continue to operate as part of the near-road regulations. See New Sites map (Figure 9-4) below for a map of the three NO_2 monitors. The NO_y monitor at Lawrenceville is required by NCore regulations. Harrison's monitor will continue to operate. Allegheny County's highest ozone readings are at the Harrison site. Operating the nitrogen oxides monitor with the highest concentration ozone monitor adds significant value to that site and for the ozone nonattainment area.

9.5. New Sites

Allegheny County must operate a Near-Road site. NO_2 is required by regulation to be monitored at all near-road stations. The green dot marks the location of the Allegheny County's Near-Road site which began monitoring NO_2 at the end of 2014.

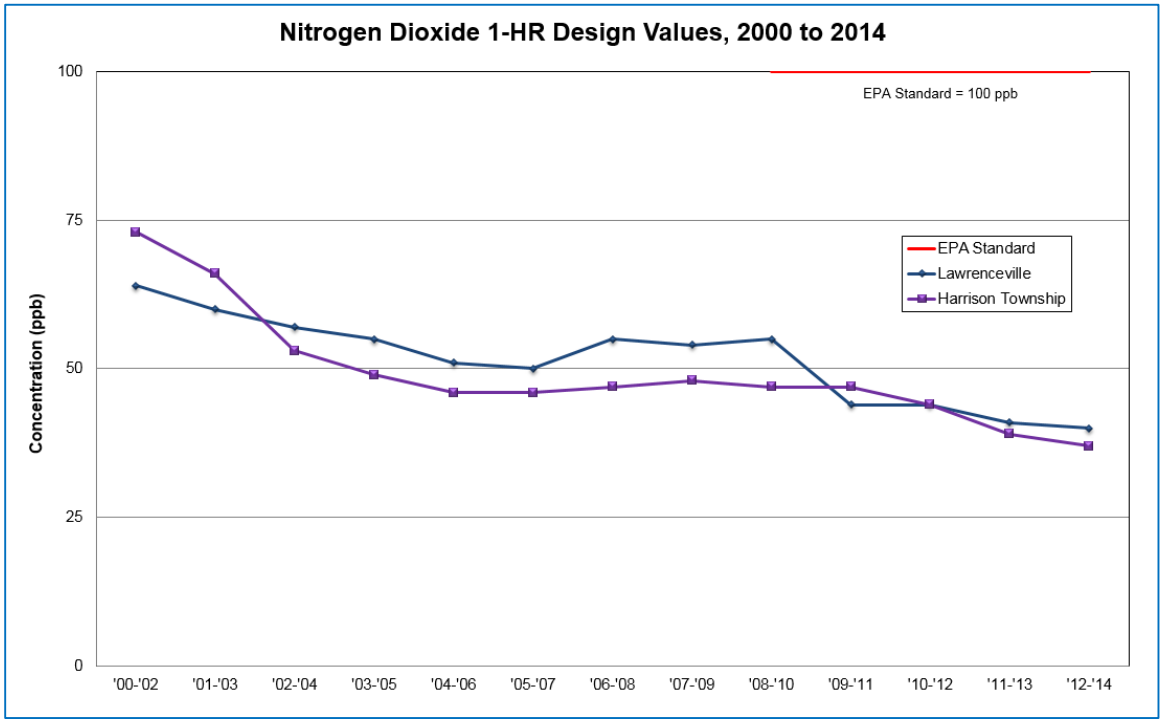
Figure 9-4. Current NO_2 Sites



9.6. Monitoring Data Trends

The two long term operating NO_2 monitors in Allegheny County are below the 100 ppb standard for NO_2. Concentrations have been slowly decreasing. Figure 9-5 displays the 1-hour design values for the past 14 year period. Allegheny County monitors are not in danger of violating the NO_2 NAAQS.

Figure 9-5. NO_2 Long-Term Annual Average Trends



9.7. Rankings

Table 9-2 below shows the ranking values and score/rank for each NO_2 monitor based on the ranking methodology.

Table 9-2. NO_2 Rankings

Nitrogen Dioxide Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 1-Hour Design Value (ppb)	2014 Annual Design Value (ppb)	Site Objective	Population Served Density (pop./mi²)	Closest Site (km)	Notes
Lawrenceville	4	35	40	10	Population Exposure	2203	9	NOy after mid-2014
Harrison	2	14	37	7	Population Exposure	144	25	
Parkway East	1	1	41	13	Near-Road	1525	9	Started in mid-2014

Nitrogen Dioxide Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2012-2014 1-Hour Design Value	2014 Annual Design Value	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Lawrenceville	1.00	1.00	0.80	0.38	1.0	0.75	0.25	0.0	5.18	**1**
Harrison	0.50	0.50	0.74	0.26	1.0	0.00	1.00	0.0	4.00	**2**
Parkway East	0.25	0.00	0.82	0.49	1.0	0.50	0.25	0.0	3.31	**3**

Lawrenceville shows the highest rank based on multi-pollutant monitoring and high population exposure at the site. This site was switched from NO_2 to NO_y in mid-2014. NO_y includes all oxidized reactive forms of nitrogen, including NO_2. Harrison continues to monitor NO_2 at the downwind ozone location for the county based on the area-wide objective.

The Parkway East site was installed based on the newer objective of near-road monitoring. While this site currently ranks last, its importance will increase with additional years of operation and installation of additional monitors. $PM_{2.5}$ will be started at the site by Jan. 1, 2017.

9.8. Summary

Allegheny County currently operates two NO_2 monitors at Parkway East and Harrison and one NO_y monitor at Lawrenceville. The Lawrenceville and Parkway East Near-Road sites are required by regulation to operate as part of the NCore and Near-Road networks, respectively, and will continue to operate as long as those regulations exist. The Harrison site is important due to its high ozone concentrations. Having nitrogen oxides assists in characterizing and tracking air quality in the northeastern part of the county. Allegheny County monitors are not in danger of violating the NO_2 NAAQS.

10. Carbon Monoxide (CO) Analysis

10.1. Area Served

The active 2014 CO monitoring stations are labeled in Figure 10-1. In 2014, the Downtown Courthouse monitoring station was closed and the monitor was relocated to the Parkway East Near-Road monitoring station. The Lawrenceville monitor was installed in 2009 as a trace level monitor as part of the NCore network. Figure 10.1 below shows area served polygons for the CO monitoring stations that were active in 2014. The green dot marks the new Near-Road monitoring station. Figure 10-2 on the following page displays CO monitors for southwestern Pennsylvania. The centrally located markers are Allegheny County monitors while the two southern monitors are operated by the PA DEP. The western PA DEP site, Houston, has discontinued CO monitoring but the remaining site, Charleroi, continues to operate.

Figure 10-1. 2014 CO Monitoring Stations

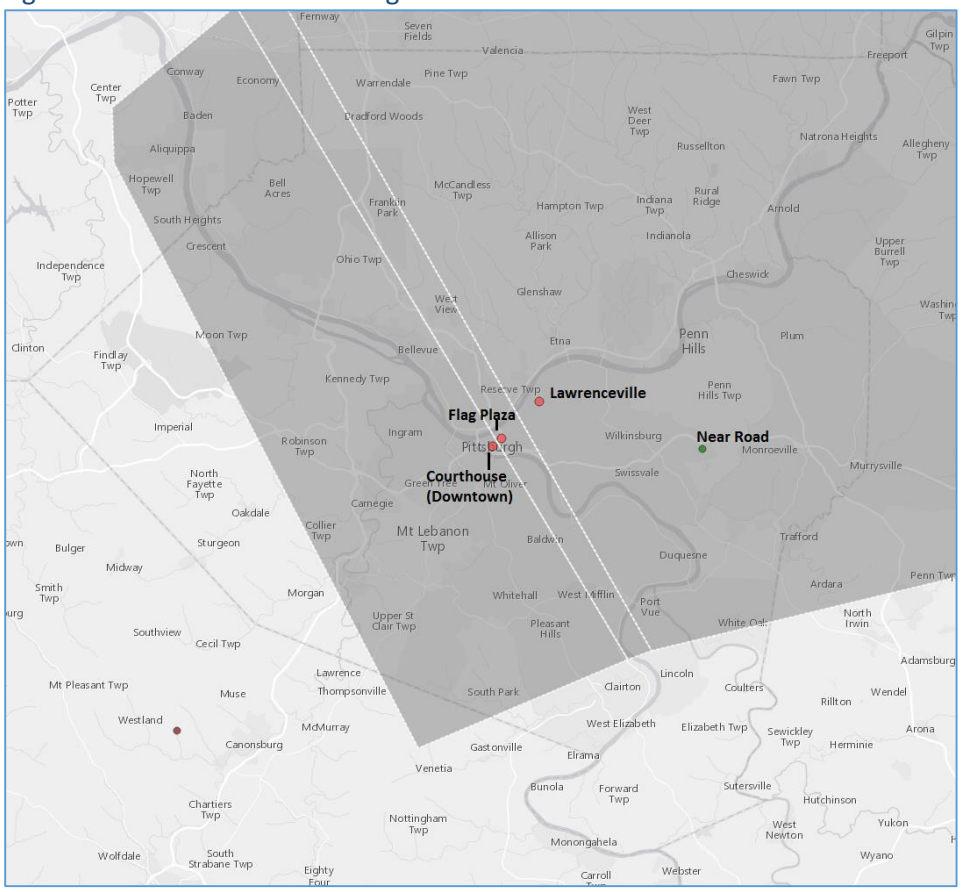
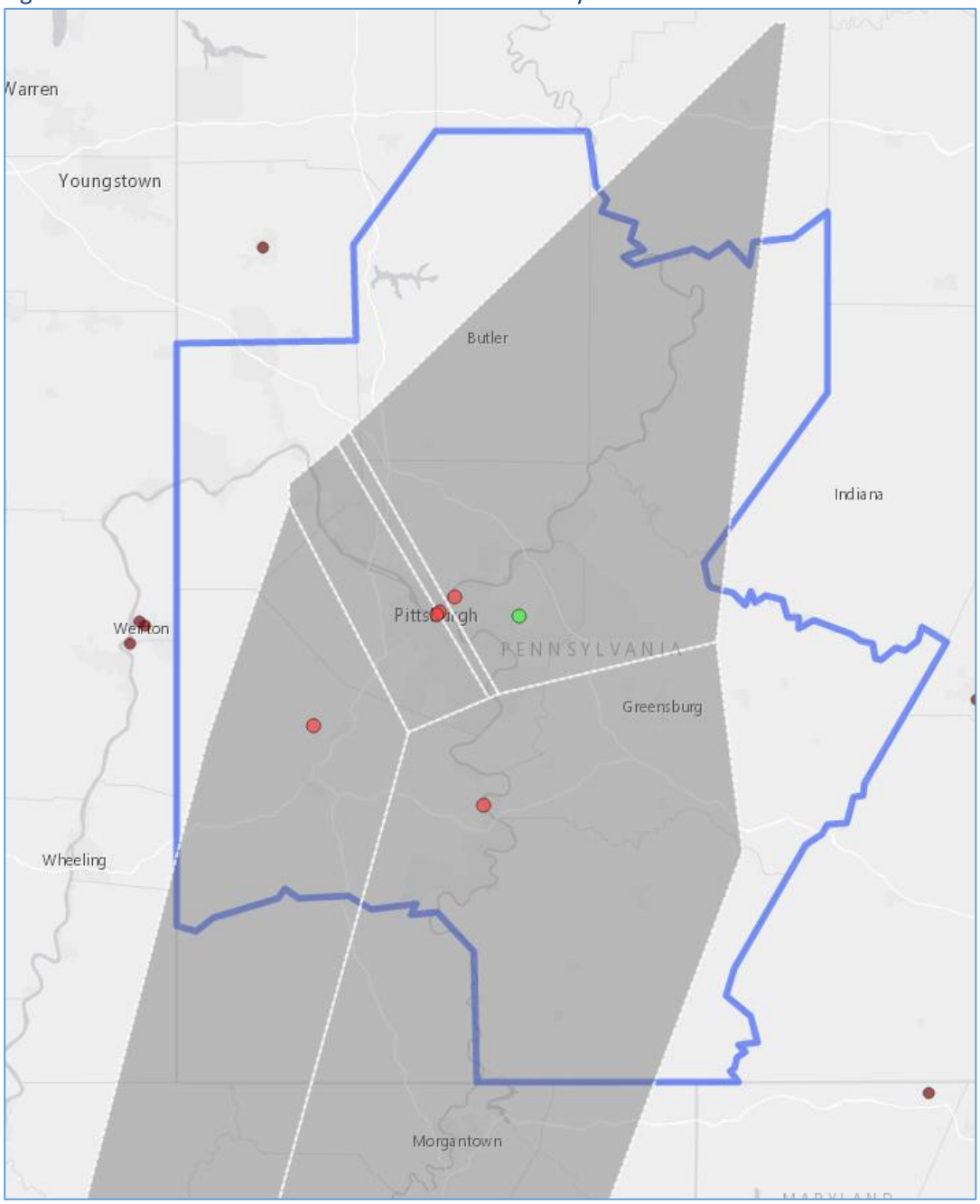


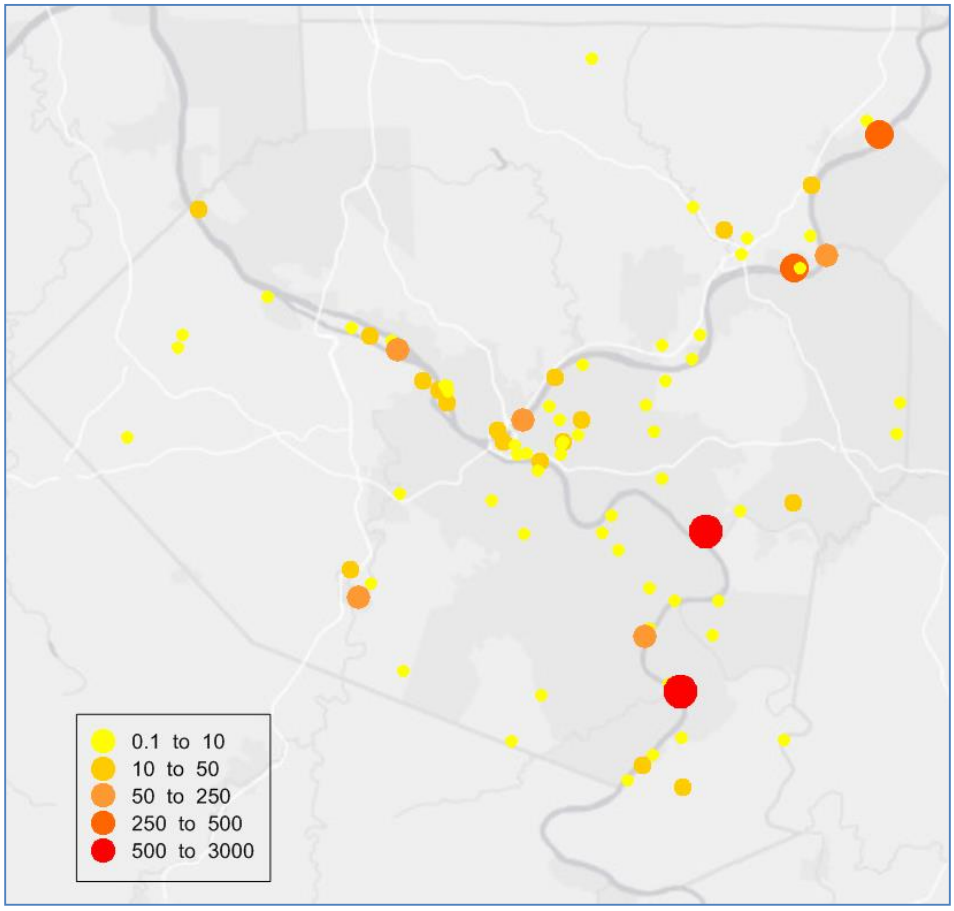
Figure 10-2. CO Area Served for Southwestern Pennsylvania



10.2. Emissions

Figure 10-3 shows point source CO emissions for Allegheny County sources, based on the 2012 emissions inventory.

Figure 10-3. CO Point Source Emissions, 2012 (tons actual)



Similar to NO_2, there are small and large sources of CO are scattered throughout the county, with the highest point source emissions in the industrial valleys and urban areas. The sources in Figure 10-3 do not account for mobile sources, a large contributor to CO emissions. (See also "Section 14. Emissions Inventory.")

10.3. Correlations

Table 10-2 below displays the 5-year average CO concentrations and the relative difference across Allegheny County in 2014. The Downtown Courthouse site was excluded because it has already been discontinued. The Parkway East Near-Road average is based on partial data from 2014. Note that concentrations are in parts per billion. All Allegheny County sites correlate very well with each other. The downtown sites have historically had the highest concentrations, but in the short term the Parkway East site has slightly higher concentrations. Continued surveillance will allow for further characterization of the Near-Road environment.

Table 10-2. Relative Difference Across ACHD's CO Network

CO ppb	Lawrenceville	Flag Plaza	Parkway East
5 Year Average	272	332	400
Flag Plaza	0.001		
Parkway East	0.002	0.001	

Note that Parkway East average is partial data from 2014.

10.4. Removal Bias

ACHD plans to operate all three CO monitors for at least the next five years. ACHD must retain the Flag Plaza CO site as part of the CO Maintenance Plan. Lawrenceville is required to operate a CO monitor as part of NCore regulatory requirement. Near-Road is required to operate a CO monitor as part of the near-road regulatory requirements.

10.5. New Sites

The three monitors in Allegheny County are not in danger of violating the CO NAAQS. Pending any new regulatory requirements, ACHD does not plan on adding any additional sites to the CO monitoring network.

10.6. Data Trends

Figure 10-4 shows the past 10 years of 1 hour maximums for each year for Allegheny County's CO monitors. The Near-Road concentration is based on partial year 2014. Figure 10-5 on the following page displays the one and eight hour maximum concentrations for the past ten years.

Figure 10-4. 1-Hour Max CO Trends

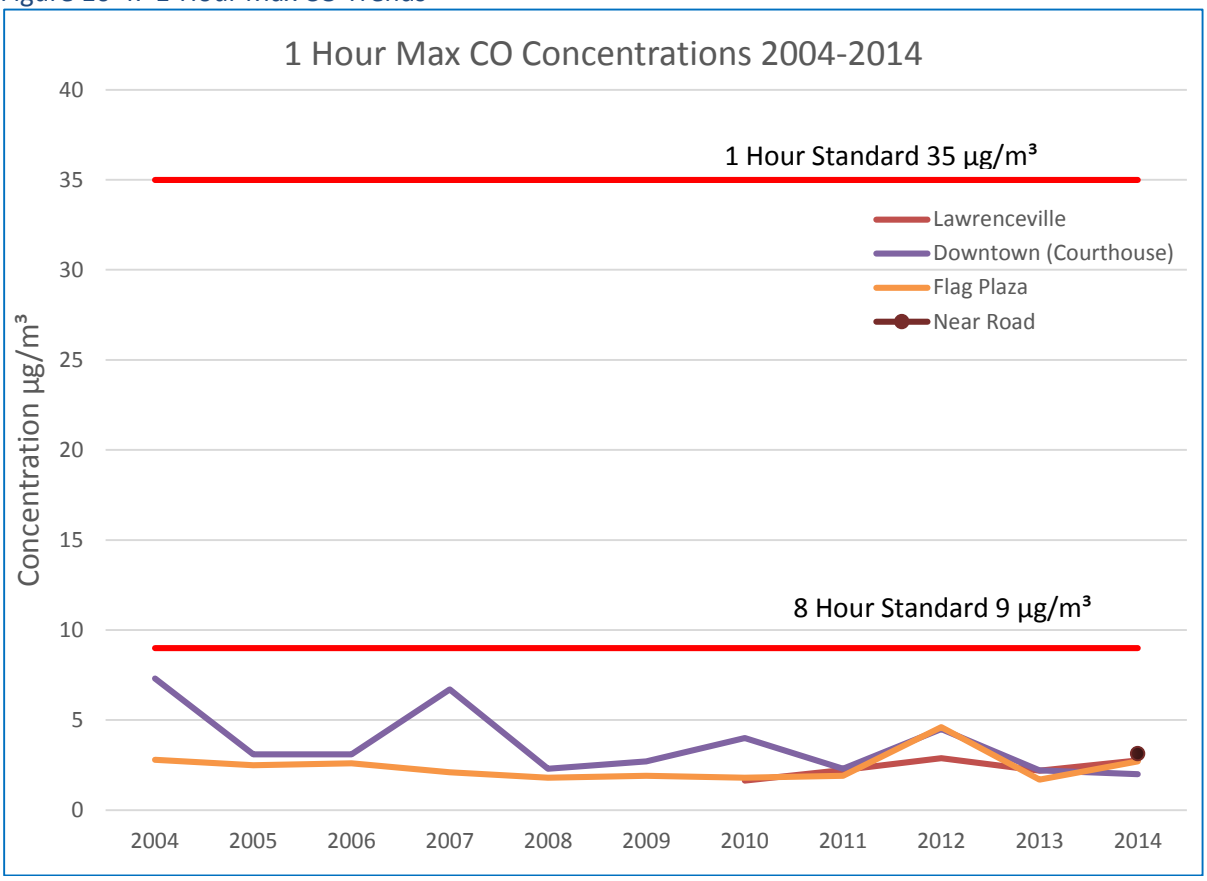
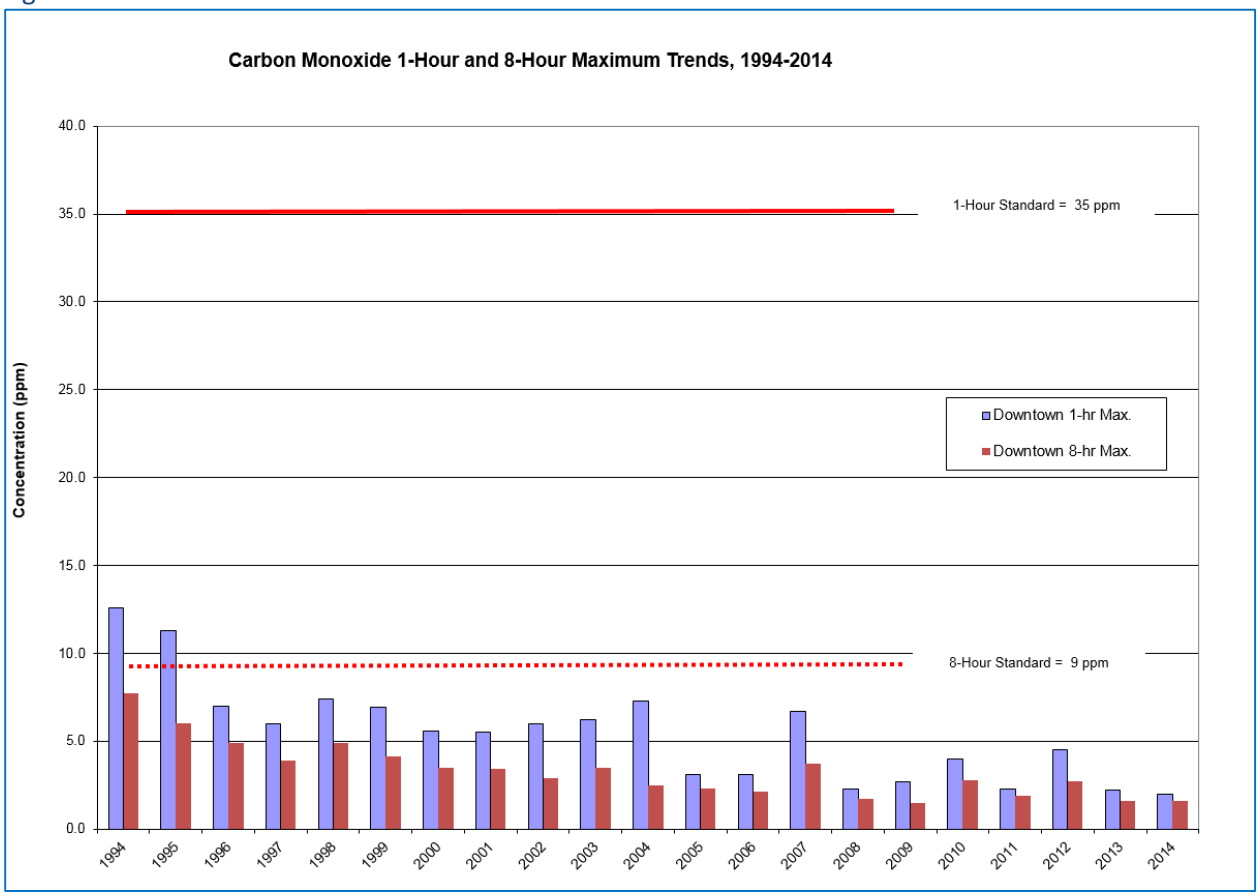


Figure 10-5. 1-Hour and 8-Hour Maximum CO Concentrations



Pittsburgh was a previously designated as a CO nonattainment area. It has been a maintenance area since 2002. The Flag Plaza and the Courthouse station represented downtown. As of September 2010, all CO areas in the United States have been redesignated to maintenance areas. CO concentrations at all Allegheny County monitoring sites have been below the 1-hour and 8-hour federal standards for years. Concentrations at the new Parkway East Near-Road site are similar to the Flag Plaza and Lawrenceville monitors. Although the Near-Road monitor shows similar concentrations to the urban sites, it is uniquely affected by the near-road environment.

Although CO concentrations are well below the NAAQS, an ancillary reason to continue to operate CO monitors is to assist data users. This includes researchers and air quality modelers, local and national.

10.7. Rankings

Figure 10-6 shows the scores and ranks for the CO monitors in Allegheny County.

Figure 10-6. CO Rankings

Carbon Monoxide Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2014 8-Hour Max (ppm)	2014 1-Hour Max (ppm)	Site Objective	Population Served Density (pop./mi²)	Closest Site (km)	Notes
Downtown	0	34	1.6	2.0	Population Exposure	2002	1	Terminated in mid-2014
Flag Plaza	1	12	1.8	2.7	Population Exposure	1982	1	
Lawrenceville	4	5	1.5	2.7	Population Exposure	968	4	
Parkway East	2	1	1.4	3.1	Near-Road	420	9	Started in mid-2014

Carbon Monoxide Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2014 8-Hour Max	2014 1-Hour Max	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Downtown	0.00	1.00	0.36	0.11	1.0	0.75	0.00	1.0	4.2	**1**
Flag Plaza	0.25	0.50	0.40	0.15	1.0	0.50	0.00	1.0	3.8	**2**
Lawrenceville	1.00	0.00	0.33	0.15	1.0	0.25	0.00	0.0	2.7	**3**
Parkway East	0.25	0.00	0.31	0.18	1.0	0.00	0.25	0.0	2.0	**4**

The Downtown site scored just above Flag Plaza due to longer time of operation and slightly higher population density. Flag Plaza, however, can show similar or higher maximum concentrations and is a better site overall for pollutant surveillance. These sites are also very close to one another in distance, less than 1 mile away. The Downtown monitor was discontinued in mid-2014 in favor of the Flag Plaza site for CO monitoring.

As part of the near-road requirements, CO was also added at the Parkway East site in 2014. While this site currently ranks last, it will increase in importance with more years of operation and additional collocated monitors (such as $PM_{2.5}$ by Jan. 1, 2017).

10.8. Summary

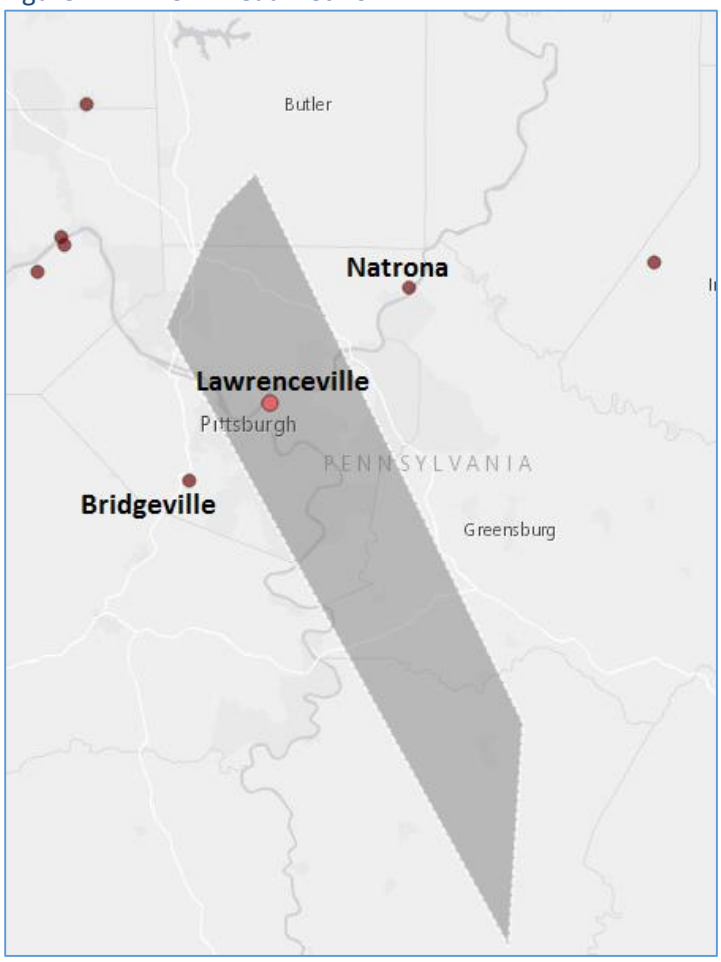
ACHD adequately monitors CO across Allegheny County. The Flag Plaza monitoring station will stay operational as part of the Maintenance Plan. The Lawrenceville trace CO monitor will continue to operate as part of the NCore network. The CO monitor at Parkway East Near-Road will continue to operate as part of the Near-Road Network. No monitors are in danger of violating the NAAQS. Unless a new regulatory requirement is promulgated, it is unlikely that a new CO monitor will be deployed.

11. Lead (Pb) Analysis

11.1. Area Served

ACHD's current Lead network is shown in Figure 11-1. The Lawrenceville site is part of the NCore monitoring network. There is a collocated pair of lead monitors at Lawrenceville. The Bridgeville and Natrona sites were installed in 2010 based on the 2008 Pb NAAQs revision that took the standard from 1.5 µg/m³ to 0.15 µg/m³. Area served polygons are not displayed for Bridgeville and Natrona. These are source oriented monitors that serve a microscale area. Conditions at those monitors do not represent large geographic areas. Natrona was discontinued in 2014.

Figure 11-1. ACHD Lead Network



The 2008 lead NAAQS revision required lead monitors to be deployed near any source of lead greater than 0.5 tons. The source for Bridgeville is G.E. Bridgeville Glass. The purpose of the Bridgeville Lead monitor is to monitor for the highest concentration in the micro scale. Allegheny Ludlum was the source that required Natrona to be installed. After five years of clean data, it was discontinued. These monitors serve the population and area directly around the source. The Lawrenceville site is part of the NCore network that studies urban population exposure and non-source oriented exposure. The Lawrenceville monitor serves the rest of Allegheny County and some areas outside of the county.

The Bridgeville monitor was placed as a result of modeling performed by ACHD. Figure 11-2 shows the modeling results. The monitor was placed as close to the modeled hotspot as possible.

Figure 11-2. Bridgeville Modeling Results

11.2. Emissions

The largest sources of lead in the county have been addressed by the Lead NAAQS. Additional sources of lead can include smelters, small metals facilities, and incinerators.

11.3. Correlations

Table 11-1 below displays the relative difference of the five-year average of the Bridgeville monitor and the four year average of the Lawrenceville monitor. Bridgeville began operation in 2010 while Lawrenceville began operation in 2011. Natrona is not included because it has already been discontinued. Note that the lead concentrations used are in ng/m³. The Bridgeville monitor does not correlate well with the Lawrenceville monitor. Bridgeville's higher concentrations are due to it being a source oriented monitor.

Table 11-1. Relative Difference Between Monitors

Lead ng/m³	Bridgeville	Lawrenceville
5 Year Average	21.82	6.33
Lawrenceville	0.22	

Note that the Lawrenceville site contains data from 2011-2014.

11.4. Removal Bias

Source oriented monitors are required to have three years of clean data before consideration to be discontinued. Because there was a lead NAAQS exceedance in 2014 at the Bridgeville monitor, the Bridgeville monitor will operate for at least three more years, if not longer. The lead monitors at Lawrenceville were previously required as part of NCore regulatory regulations. Revised regulations do not require these population exposure monitors. It is likely that Allegheny County will continue to operate these monitors for historical population exposure trends.

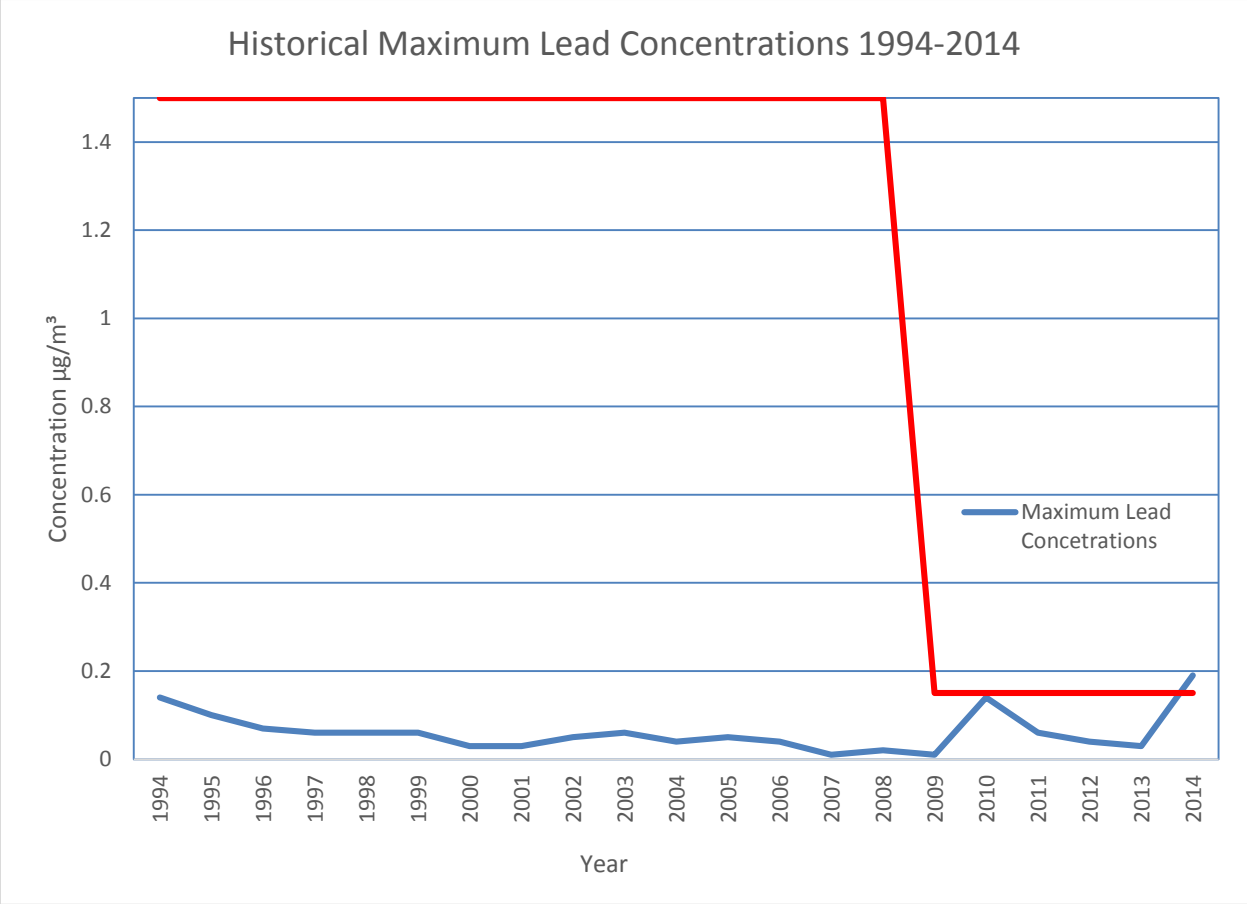
11.5. New Sites

Unless there is a new industrial source of Lead, ACHD does not plan on installing any additional Lead monitors. Sampling frequency at Bridgeville has increased from 1 in 6 days to 1 in 3 days as a result of the violation. A collocated monitor may be installed at the Bridgeville monitoring site for additional surveillance and quality assurance. There may be issues at the site that will prevent the installation of an additional monitor.

11.6. Data Trends

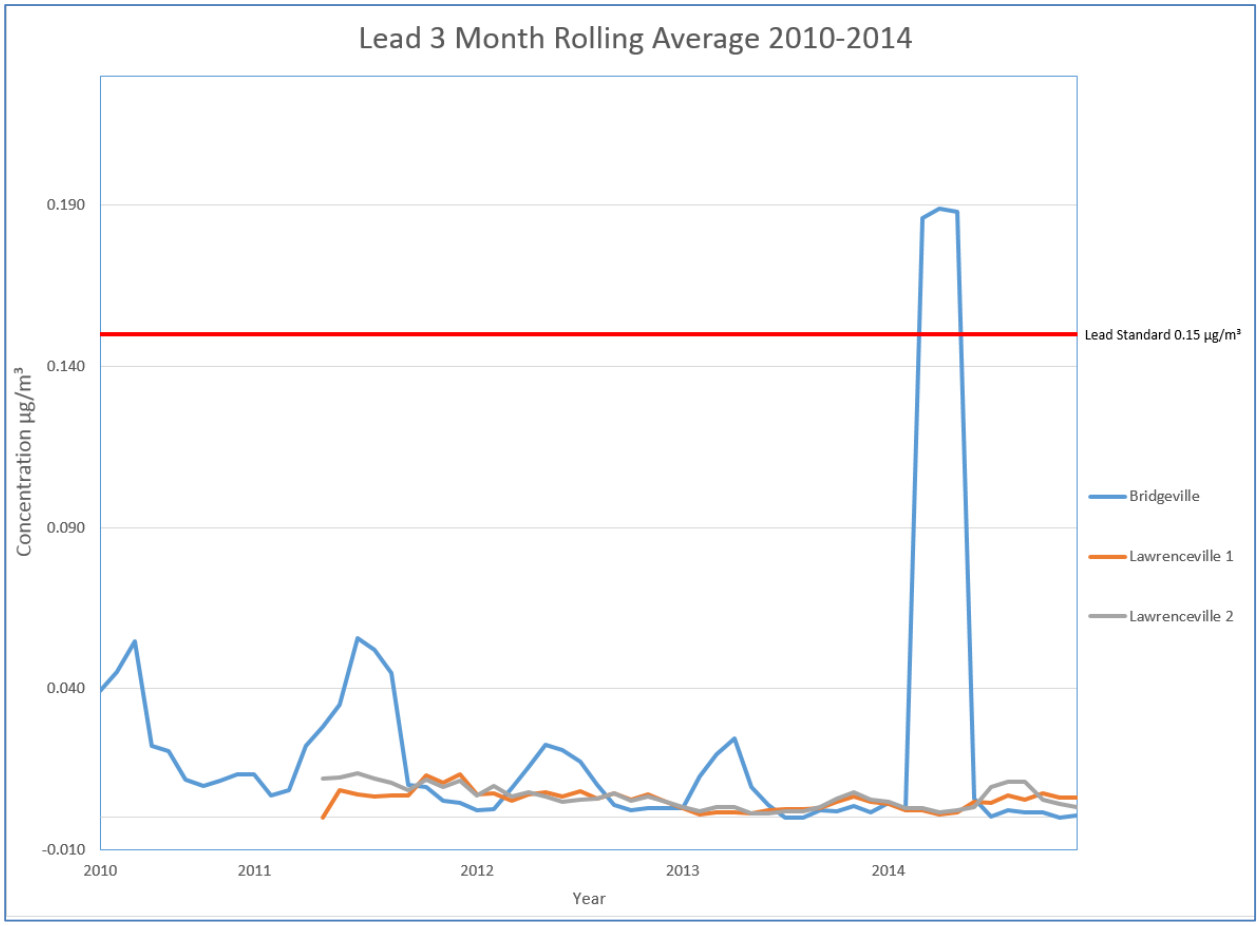
Prior to source oriented monitoring, lead concentrations have been low and steady. In 2010, ACHD started source oriented surveillance at two sites, Bridgeville and Natrona. The Natrona monitoring site was discontinued after five years of clean data. The industrial source made major modifications to its operations that significantly lowered its lead emissions. The rise in concentrations in recent years is due to the new purpose of the lead monitoring network. The maximum Lead concentrations across Allegheny County's network are displayed below in Figure 11-4.

Figure 11-4. Historical Maximum Lead Concentrations



In 2014, there was a lead NAAQS exceedance at the Bridgeville monitoring site. Allegheny County has not had an exceedance at any lead monitor in the twenty years prior. Figure 11-5 shows the three month average concentrations in Allegheny County since 2010.

Figure 11-5. Near-Term Lead Trends



11.7. Rankings

Figure 11-6 shows the scores and rankings for lead (Pb) in Allegheny County.

Figure 11-6. Lead (Pb) Rankings

Lead (Pb) Ranking Values by Criteria

Site	# of Other Pollutants at Site	# of Years in Operation	2014 3-Month Design Value (µg/m³)	Site Objective	Population Served Density (pop./mi²)	Closest Site (km)	Notes
Bridgeville	0	5	0.189	Highest Concentration	75	16	
Lawrenceville	4	4	0.007	Population Exposure	468	16	Trends Only
Natrona	0	5	0.022	Highest Concentration	124	26	

Lead (Pb) Score and Rank

Site	# of Other Pollutants at Site	# of Years in Operation	2014 3-Month Design Value	Site Objective	Population Served Density	Closest Site	In NAA or MA	Score	Rank
Bridgeville	0.00	0.00	1.32	1.0	0.00	0.75	0.0	3.07	**1**
Lawrenceville	1.00	0.00	0.05	1.0	0.00	0.75	0.0	2.80	**2**
Natrona	0.00	0.00	0.15	1.0	0.00	1.00	0.0	2.15	**3**

Bridgeville is the most important site based on design values. Bridgeville and Natrona were both deployed as source-oriented monitors based on the 2008 Lead NAAQS. Natrona was discontinued at the end of 2014 due to low concentrations and source modifications; accordingly, it also showed the lowest ranking. Lawrenceville currently serves as an area-wide monitor for Pb, but proposed revised NCore regulations do not require this monitor.

11.8. Summary

The Bridgeville monitor was properly placed in the modeled hotspot for source oriented monitoring. Because there has been an exceedance, the Bridgeville monitor will continue to operate for at least the next three years. Because of the exceedance, frequency of sampling will move from a 1 in 6 day schedule to a 1-in-3 day schedule. A collocated monitor may be installed for additional quality assurance. There may be issues at the site that will prevent the installation of an additional monitor. This additional surveillance will not place a large resource burden on Allegheny County. The recently removed Natrona monitor can be redeployed. If there are three years of clean data posted after the exceedance, then the monitor may qualify to be discontinued. Barring the installation of a new industrial source of lead in the county, there will be no new additional source oriented lead monitoring in the county. Although revised NCore regulations do not require lead monitoring, it is likely that Allegheny County will continue to operate a population exposure lead monitor for historical purposes. EPA reviewed the lead standard in 2014 and proposed no changes to the Lead NAAQS in 2015. If EPA determines that the violation at the Bridgeville monitor constitutes a naming the area as a nonattainment area, then additional surveillance by ACHD may be necessary.

12. Air Toxics

Air toxics (or Hazardous Air Pollutants, HAPs) are measured at Flag Plaza, Liberty, and Avalon. Flag Plaza exposure is based on urban and mobile sources, while Liberty and Avalon exposures are source-oriented.

Flag Plaza measures many air toxic and related compounds using canister and cartridge methods. Results from 2013 (most recent complete year of data) are given below in Table 12-1 for selected air toxics.

Table 12-1. Selected Air Toxic Compounds, Flag Plaza, 2013

Compound	2013 Average (ppb)	2013 24-Hour Maximum (ppb)
1,3-Butadiene	0.03	0.11
Hexane	0.10	0.67
Chloromethane	0.65	0.78
Methylene chloride	0.11	0.98
Benzene	0.27	0.74
Toluene	0.26	0.82
m- & p- Xylene	0.07	0.23
Acetaldehyde	0.69	2.12
Acrolein	0.03	0.15
Formaldehyde	1.49	4.72
Methyl ethyl ketone (MEK)	0.22	0.69
Methyl isobutyl ketone (MIK)	0.01	0.11
Propionaldehyde	0.12	0.37

Starting in 2014, Liberty and Avalon measured benzene and related compounds by charcoal tube method. Results from 2014 for benzene are given below in Table 12-2.

Table 12-2. Benzene, Liberty and Avalon, 2014

Site	2014 Average (ppb)	2014 24-Hour Maximum (ppb)
Liberty	1.27	9.26
Avalon	0.24	1.62

Benzene shows importance at Liberty compared to Flag Plaza and Avalon.

13. Meteorology

The geography in Allegheny County can create complex wind flow patterns. The topography of the county can be described as a dissected plateau, with three major river valleys: Allegheny, Monongahela, and Ohio. These valleys are generally the locations for major industries. Meteorological data collected from plateau sites, such as the Pittsburgh International Airport (PIT), can be representative of the larger area but not always representative of wind flow patterns within the highly industrialized river valleys.

While the winds tend to blow through the county from the southwest at the plateau level, winds within the river valleys tend to be more complex. Typically during the nighttime, a decoupling between the river valley and plateau temperature and wind velocity profiles can exist. The river valley flow pattern is usually oriented down river while the plateau flow pattern usually has a cross-river orientation. The large rivers have many tributaries which are effectively notches in the side of the river valley. These notches can create unusual wind direction patterns as the wind enters or leaves the main river valley. The combination of river valley flow and plateau flow create, under the above mentioned meteorological conditions, divergence, convergence, and even circular flow near these notches. During the daytime with the heating of the earth and air, the temperatures and wind velocity profiles become more unified and smaller deviations can be expected between the plateau and river valley flows.

The wind speeds at the plateau level are an important factor in the determination of wind directions in river valleys. If the surface-to-upper-level wind velocities are organized in a manner conducive to high wind speeds at the surface, then the river valley wind direction will tend to follow the plateau wind direction. If the plateau wind speeds reduce to light winds, the organization and the persistence of the wind direction in the river valley will start to change as compared to the plateau level, and local physical and meteorological characteristics of the river valley may start to dominate.

13.1. Meteorological Sites

The ACHD meterological network has been designed to monitor air at both the regional plateau and river valley levels. Long-term wind roses from 4 sites in operation from 2010-2014 (Avalon, Liberty, Lawrenceville, and South Fayette) are shown on the following pages.

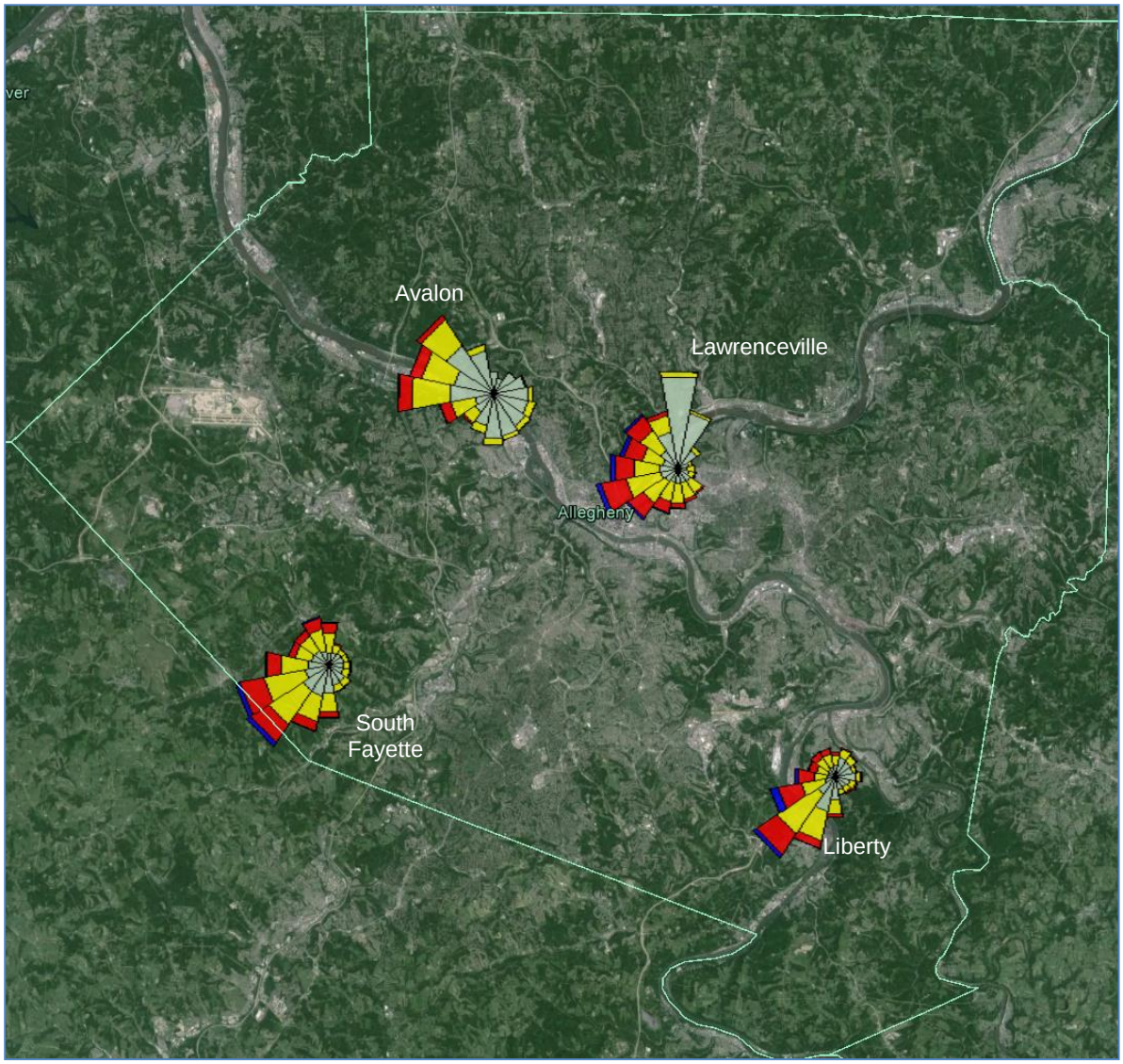
A new site at the Parkway East Near-Road location was started in mid-2014. Preliminary results show predominant southwesterly flow. Also, the North Braddock site was restarted for meteorological monitoring in 2015. This site had historically shown a combination of valley and plateau flow.

A special site has also been established for a multi-level acoustic sodar at the USS Clairton plant. Results are valid for 2014, though poor for recovery. Data from this sodar is also shown in this section. This monitor has been important for modeling focused on in-valley flow patterns.

Additional meteorological sites, especially in river valley areas, including multi-level sensors, would provide useful information for future air quality studies and would help to better characterize airflow in and out of the valleys.

Figure 13-1 below shows wind roses by local ACHD site in Google Earth. Wind roses indicate frequencies of hourly wind direction and wind speed.

Figure 13-1. ACHD Site Wind Roses, 2010-2014, Aerial View

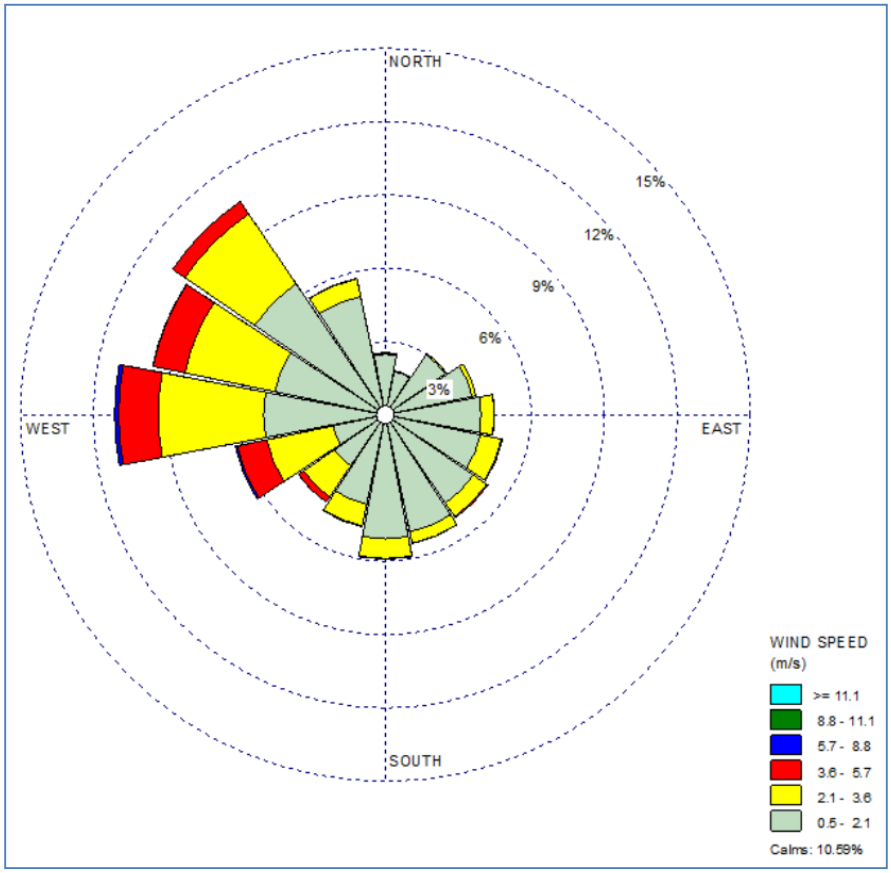


Note: Wind roses shown here are based on wind data from 2010-2014, generated by the WRPLOT program.

Avalon

Avalon lies at an elevation of 836 feet, approximately 130 ft above the Ohio River. It exhibits a combination of regional and valley flow and is adequate for characterizing wind in the Neville Island industrial area.

Figure 13-2. Avalon Wind Rose (2010-2014)

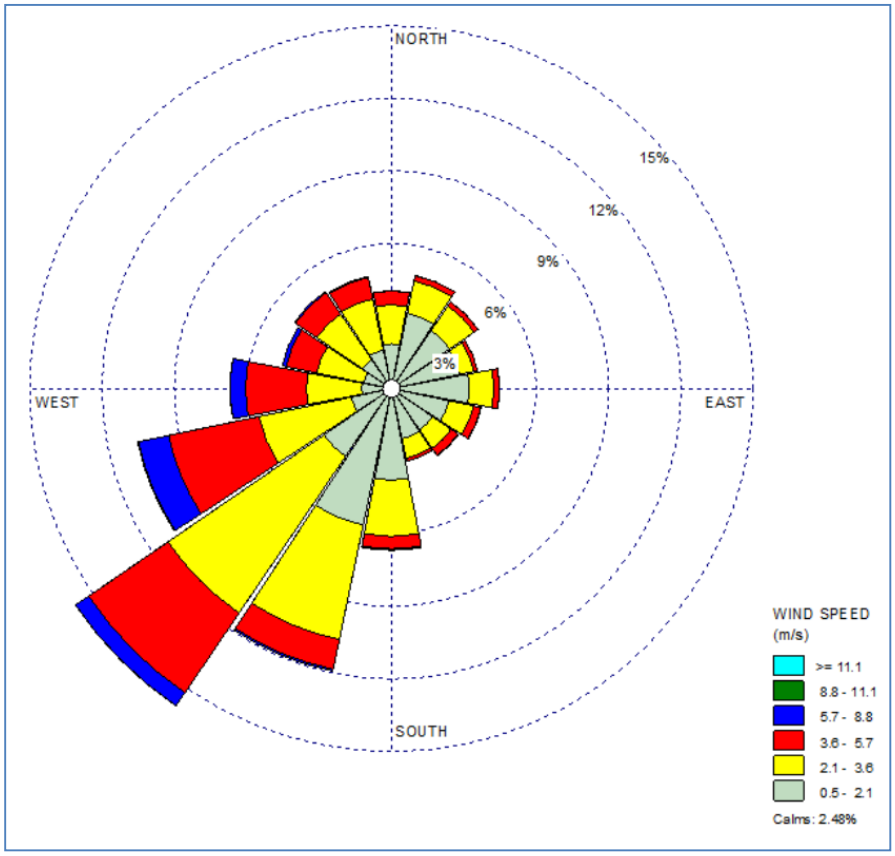


Avalon shows a combination of valley and regional flow.

Liberty

Liberty lies at an elevation of 1061 feet between the Monongahela and Youghiogheny river valleys. It exhibits mostly regional flow and is adequate for characterizing plateau wind in the Liberty area.

Figure 13-3. Liberty Wind Rose (2010-2014)

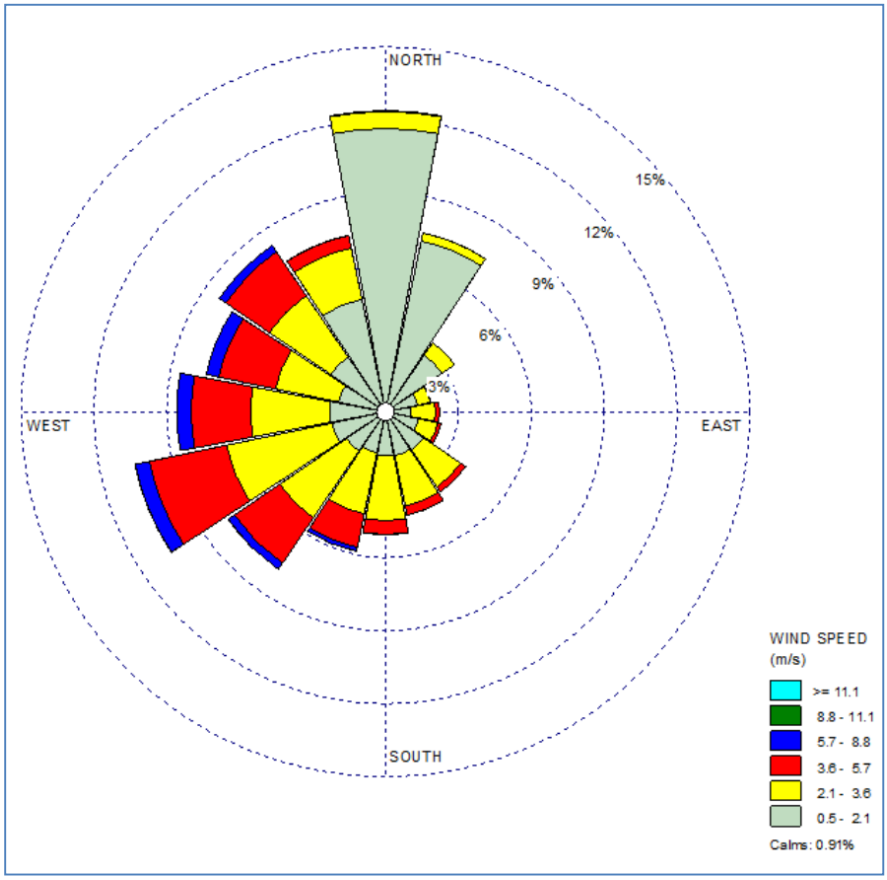


Liberty exhibits mainly southwesterly winds that are indicative of prevailing winds across the county.

Lawrenceville

Lawrenceville lies at an elevation of 847 feet, approximately 130 feet above the Allegheny River (0.5 miles away). It exhibits a combination of regional and valley flow.

Figure 13-4. Lawrenceville Wind Rose (2010-2014)

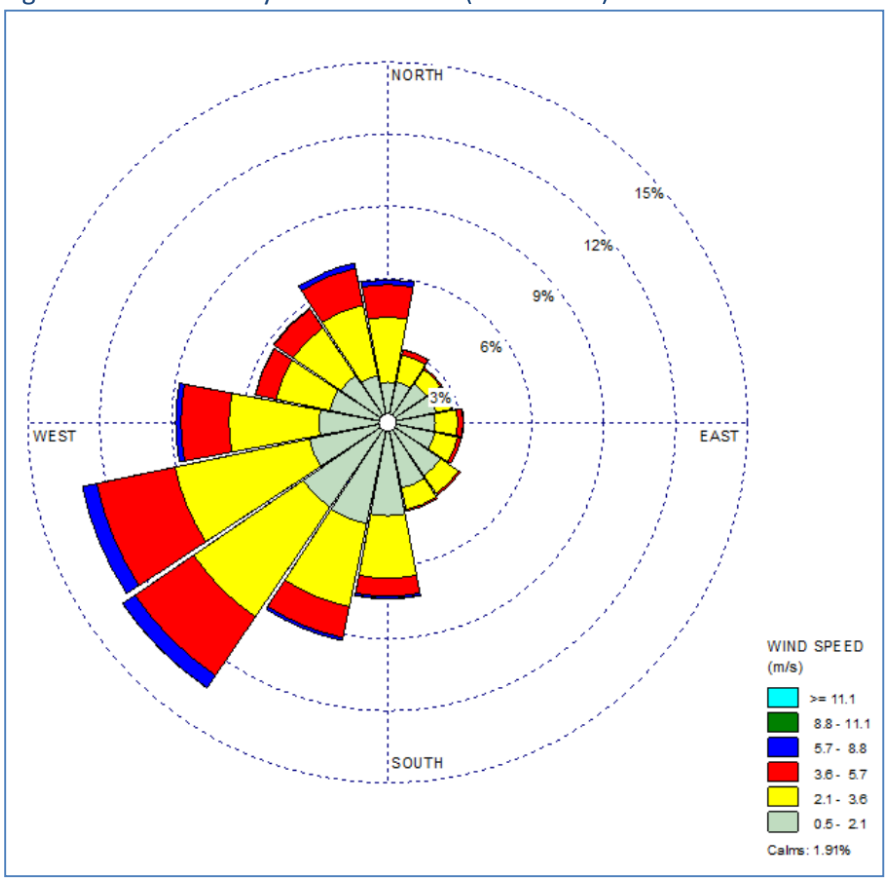


Lawrenceville shows regional southwesterly winds at moderate to high wind speeds, with a high frequency of northerly winds at low wind speeds indicative of winds steered by the Allegheny River valley and possibly its Pine Creek tributary.

South Fayette

South Fayette lies at a high elevation of 1235 feet and shows similar wind patterns to the National Weather Service Pittsburgh International Airport (PIT) site. It exhibits regional flow like the PIT site but at lower overall wind speeds, possibly due to different height or positioning above ground.

Figure 13-5. South Fayette Wind Rose (2010-2014)



South Fayette shows regional southwesterly winds.

Sodar

The Clairton sodar lies at 232 m elevation on US Steel property. It can measure multi-level winds from 30 m up to 170 m, sometimes recording data at even higher levels. This is a special study monitor designed to measure site-specific in-valley winds for use in modeling, including modeling validation. Results to date have shown unique valley patterns, significantly different from plateau sites.

Figure 13-6. Sodar Radar Plot, Wind Frequency, 30-170 m Levels (2014)

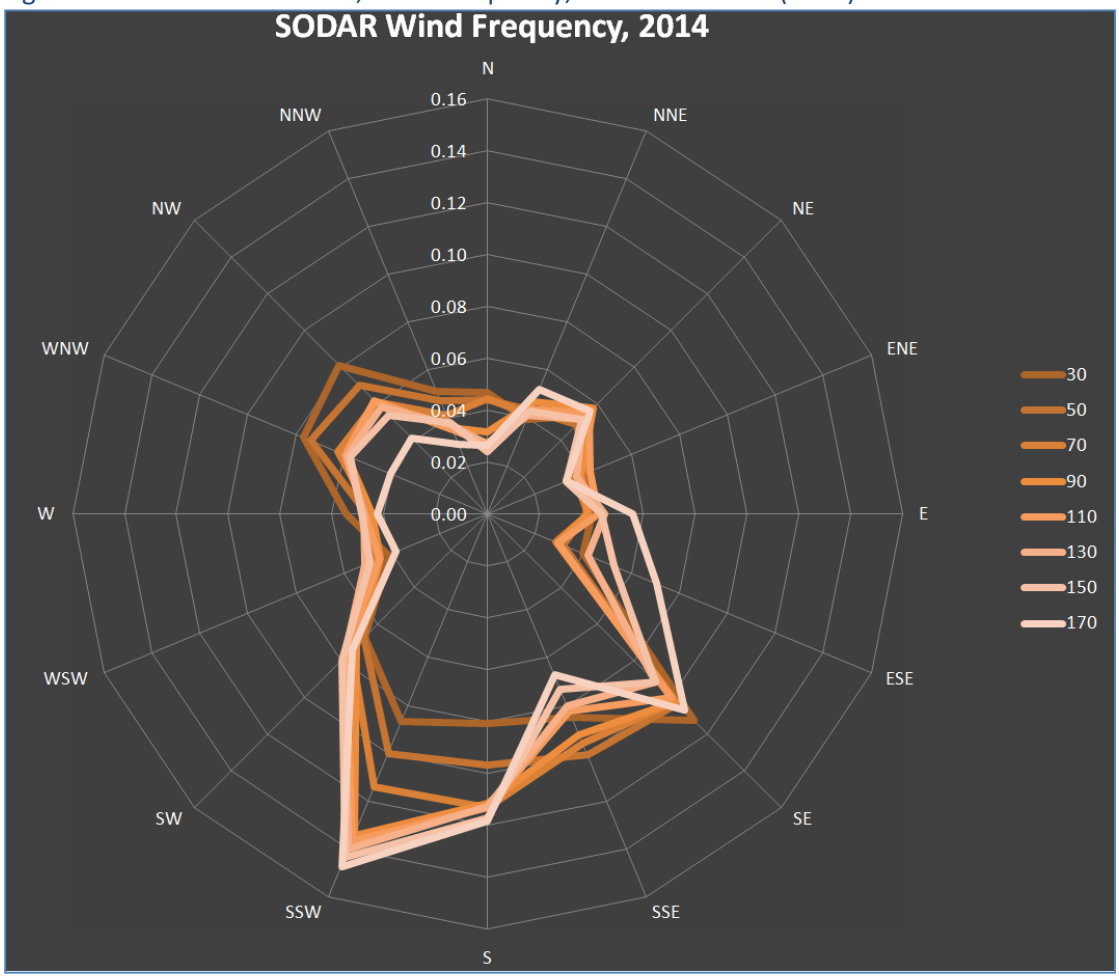
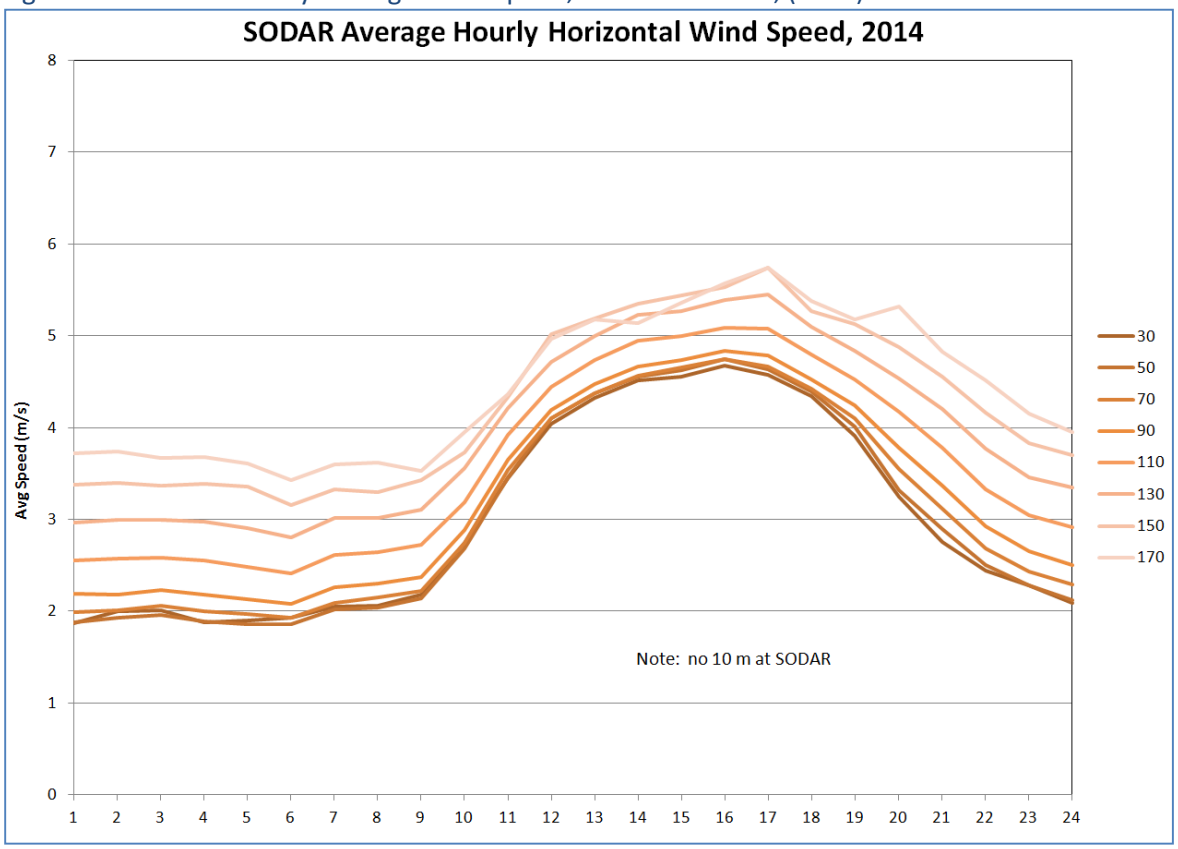


Figure 13-7. Sodar Hourly Average Wind Speed, 30-170 m Levels, (2014)



13.2. Effect of Inversions

Air quality in southwestern Pennsylvania, as in most other areas of the U.S., is very much influenced by temperature inversions, especially surface based temperature inversions. A temperature inversion is a condition in the atmosphere that yields little or no mixing of the air.

An atmospheric temperature inversion occurs at the surface when air temperature increases with increasing height above the ground. This situation is the inverse of the "normal" condition where a warm ground keeps low lying air warmer than air higher up and the warm air can rise, causing the atmosphere to mix.

A surface based (or ground level) temperature inversion forms when air next to the ground cools faster than air at higher altitude or when warmer air is advected over cooler surface air. So, warmer, lighter air is found above cooler, heavier air. In such a situation, air is stable and mixing within the surface air layer will be suppressed.

The dispersion of atmospheric contaminants is affected by the stability of the atmosphere. Typically, some of the worst-case conditions for the buildup of pollution concentrations occur under stable situations when surface based temperature inversions are present.

To collect temperature and various other conditions starting at the surface, the National Weather Service (NWS) releases a balloon with a radiosonde measurement transmitter (see photo) into the atmosphere twice a day – once in the morning and once in the afternoon or evening – at about 70 locations across the contiguous U.S. There are similar scheduled launches at about 1000 locations outside the U.S. These twice daily radiosonde observations are used throughout much of the world to help interpret weather conditions in the upper atmosphere. In air pollution meteorology, such observations are critical to characterizing dispersion potential in the lower portions of the atmospheric boundary layer (ABL).

The tables below show the strength and frequency of surface based temperature inversions estimated from Pittsburgh-area NWS balloon launches from 2010 through 2014. (The radiosonde is launched from the Pittsburgh NWS forecasting office located in Moon Township.)

Table 13-1. Morning Inversions* for 2010–2014 (Derived from PIT NWS ** Soundings)

Year	Avg. Strength (°C)	Strength Std. Dev. (°C)	Avg. Top (m)	Top Std. Dev. (m)	Total Days with Inversion	% of Days/Year with Inversion
2010	4.1	2.3	226	115	171	47%
2011	3.7	2.1	246	118	134	37%
2012	3.9	2.1	229	96	158	43%
2013	3.4	1.8	244	113	127	35%
2014	3.4	1.9	233	117	141	39%
’10-’14 Avg.	3.7	2.0	236	112	146	40%

** For morning (12Z, i.e., 7 a.m. EST) surface inversions of at least 1.0 °C in strength (shallow isothermal and/or unstable conditions may also be present below or within ground inversion)*
*** PIT NWS = Pittsburgh National Weather Service*

During this 5-year period, the strength of morning (12Z, i.e., 7 a.m. EST) inversions (measured by degree of temperature increase with height) was 3.7 °C on average, topping out at 236 meters above the ground. About 40% of mornings experienced a significant (at least 1 °C) inversion. On average, the inversions dissipated by 9:30 a.m. EST.

Note that since the radiosonde is released at an elevation of about 359 m (1180 feet) MSL, the data produced does not necessarily represent conditions in the many river valleys throughout the county. In valleys or low lying areas, inversions can form first and/or be more intense and longer lasting than at elevated locations. So, in the many river valleys throughout Allegheny County, inversions are expected to be much more frequent and more intense and of longer duration than those recorded at the Pittsburgh NWS, which is located significantly above the river valleys. This can certainly be a problem for local air quality, since many large industrial operations are located in the valleys.

Once air pollutants are released, they are transported and spread into surrounding neighborhoods. This contaminant dispersion is facilitated by the wind and stability conditions of the atmosphere. If an inversion exists, it acts like a cap that restricts airflow within, or even outside, the valley, preventing pollution from quick dispersal.

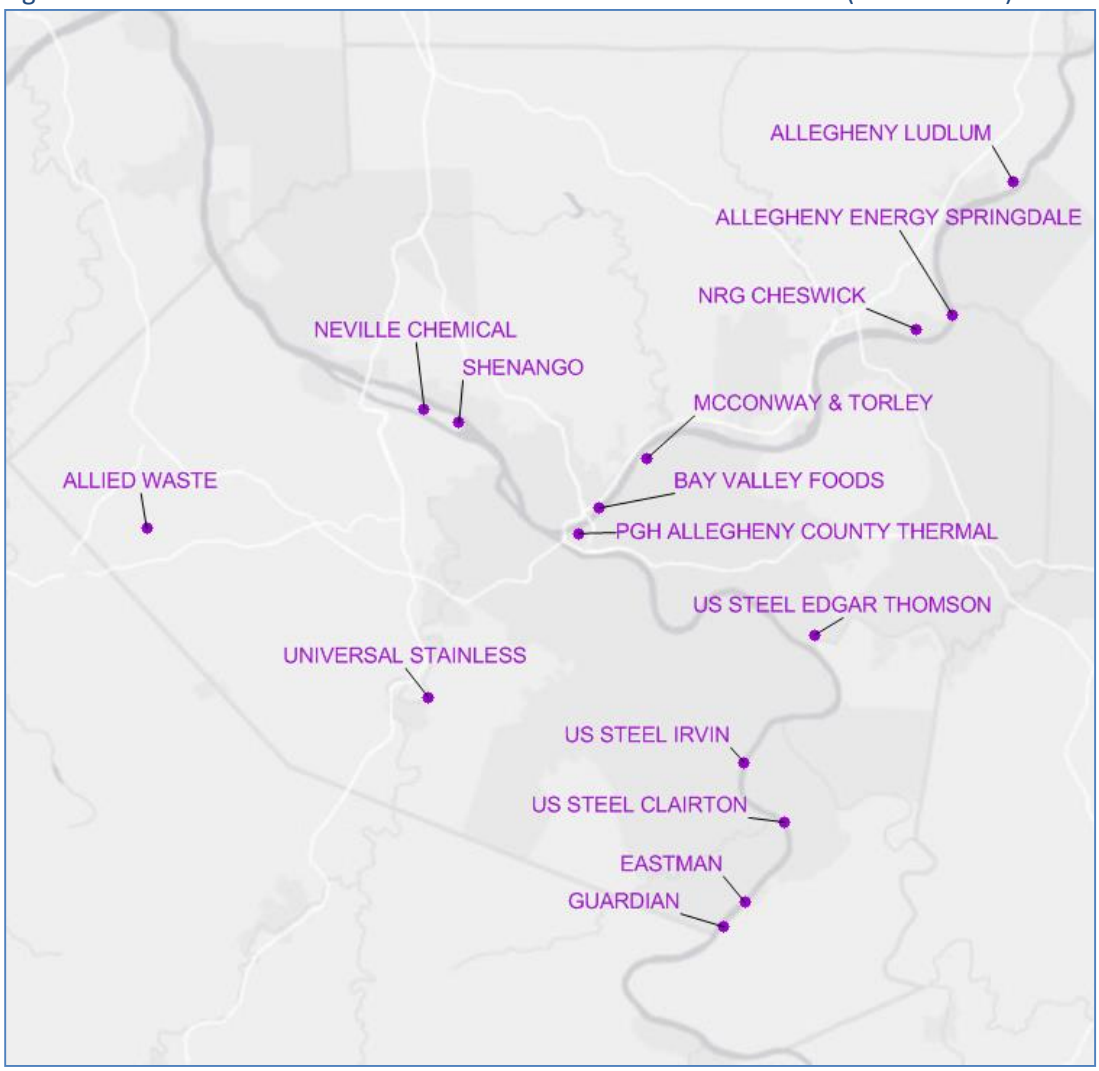
Regardless of whether an inversion forms in or out of a valley, with sufficient sunshine, wind speed, substantial change in wind direction, and/or precipitation, inversions will eventually dissipate to allow air to once again flow freely and air quality to improve.

14. Emissions Inventory

ACHD compiles annual emissions inventories for point sources within Allegheny County. PA DEP also compiles inventories for other emissions sectors every 3 years for EPA's National Emissions Inventory (NEI) database.

Figure 14-1 shows the largest point sources in Allegheny County based on total criteria pollutant emissions in 2012.

Figure 14-1. Sources with >100 Tons Total Criteria Pollutant Emissions (2012 actuals)



Many of the monitoring sites are focused on these source emissions and their resulting impacts. Emissions from other sectors such as mobile and area sources can affect the county as a whole. Emissions transported into the county from surrounding electric generating units (EGUs) can also be important for ozone and $PM_{2.5}$.

Table 14-1 below shows the Allegheny County emissions inventory by emissions sector for 2014. These emissions were based on projected 2014 emissions included in the 2006 NAAQS $PM_{2.5}$ SIP. Ammonia (NH_3) is included here as a potential precursor to $PM_{2.5}$.

Table 14-1. Allegheny County Emissions Inventory by Sector, 2014 Projected (tons)

Sector	$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	NH_3
Point Sources	2966	3430	10287	14432	1511	7217	510
Area Sources	2394	5984	6350	4163	15762	12801	313
Nonroad Sources	451	481	195	8557	3996	51360	10
Mobile Sources	416	605	69	11472	6094	82751	275
Totals	6226	10500	16901	38624	27362	154129	1108

Note: Mobile sources emissions are interpolated from 2011 and 2017 values from the Pittsburgh-Beaver Valley $PM_{2.5}$ emissions inventory (June 2014).

Table 14-1 shows that point and area source emissions are important for the siting of SO_2 and PM monitors. All sectors can be contributors to NO_x and ozone, and mobile and nonroad sources are the most important sectors for CO. Table 14-2 below shows Allegheny County total emissions by sector for 2014.

Table 14-2. Allegheny County Emissions by Sector, 2014 Projected (tons)

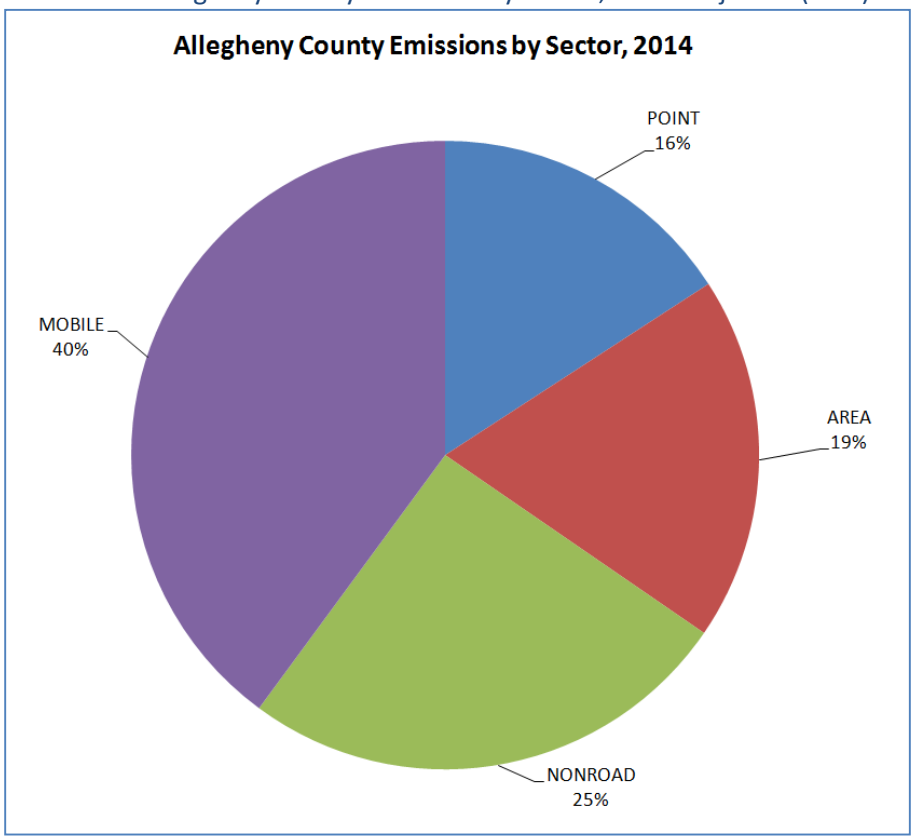


Table 14-2 shows that while point source emissions can be important for specific pollutants and corresponding nonattainment areas, mobile sources are the largest contributor to criteria pollutant emissions.

Additionally, Allegheny County can be affected by the transport and transformation of pollutants (and precursors) from the surrounding Pittsburgh CBSA, as well as surrounding states. Table 14-2 shows the emissions inventory for Allegheny County compared to the surrounding CBSA. Projected 2014 point source emissions were updated with preliminary reported 2014 EGU emissions from EPA's Clean Air Markets database.

Table 14-2. SWPA Emissions Inventory, All Sectors, 2014 Projected (tons)

Area	$PM_{2.5}$	PM_{10}	SO_2	NO_x	VOC	CO	NH_3
Allegheny County	6226	10500	16901	38624	27362	154129	1108
Surrounding CBSA Counties	12284	23620	66313	87299	43084	267347	3893

Table 14-2 indicates that considerable amounts of emissions can potentially impact Allegheny County from the surrounding counties. The ACHD monitoring network has been designed to adequately account for emissions outside of the county.

15. Population Summary

This section provides a summary of population in Allegheny County and the surrounding statistical areas.

15.1. Population Counts

The Pittsburgh, PA Core Based Statistical Area (CBSA) consists of the City of Pittsburgh, Allegheny County, Armstrong County, Beaver County, Butler County, Fayette County, Washington County, and Westmoreland County.

The larger Pittsburgh-New Castle-Weirton, PA-OH-WV Combined Statistical Area (CSA) contains the Indiana, PA Micropolitan Statistical Area, the New Castle PA Micropolitan Statistical Area, the Pittsburgh PA Metropolitan Statistical Area, and the Weirton-Steubenville, WV-OH Metropolitan Area.

Table 15-1. Population Estimates for Allegheny County

	Allegheny County, PA
2010 Census	1,223,348
U.S. Census Bureau Estimate	
2011	1,227,308
2012	1,229,912
2013	1,232,953

Table 15-2. Population Estimates for the Pittsburgh, PA CBSA

	Pittsburgh, PA CBSA
2010 Census	2,356,285
U.S. Census Bureau Estimate	
2011	2,359,783
2012	2,360,989
2013	2,360,867

Table 15-3. Population Estimates for the Pittsburgh, PA CSA

	Pittsburgh, PA CSA
2010 Census	2,660,727
U.S. Census Bureau Estimate	
2011	2,661,980
2012	2,661,476
2013	2,659,937

Figure 15-1 below displays population count by municipality for Allegheny County for 2013. The City of Pittsburgh understandably is the most densely populated municipality in the county. There are dense suburbs outside of the city in all cardinal directions.

Figure 15-1. Population Count by Municipality for Allegheny County

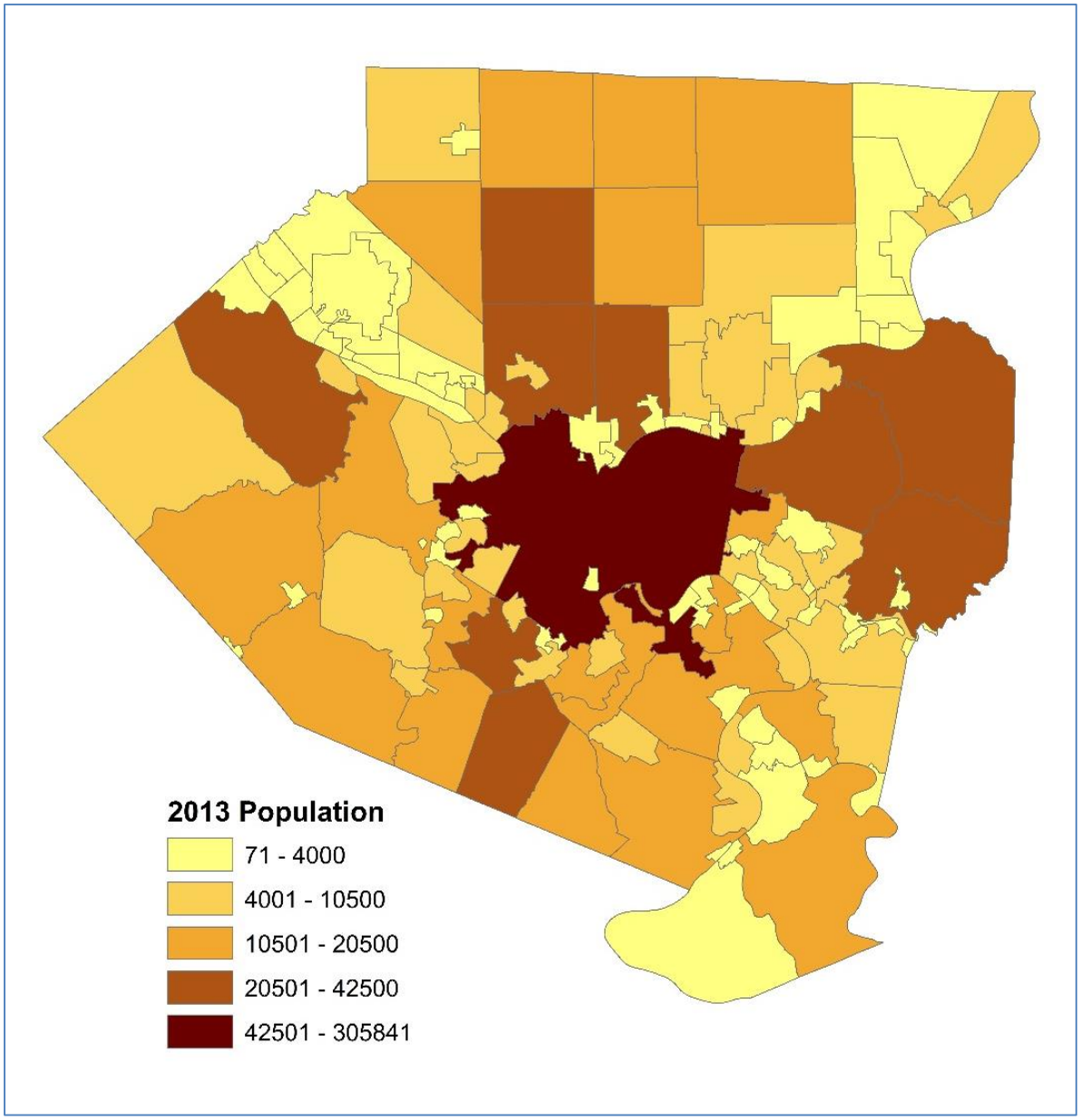
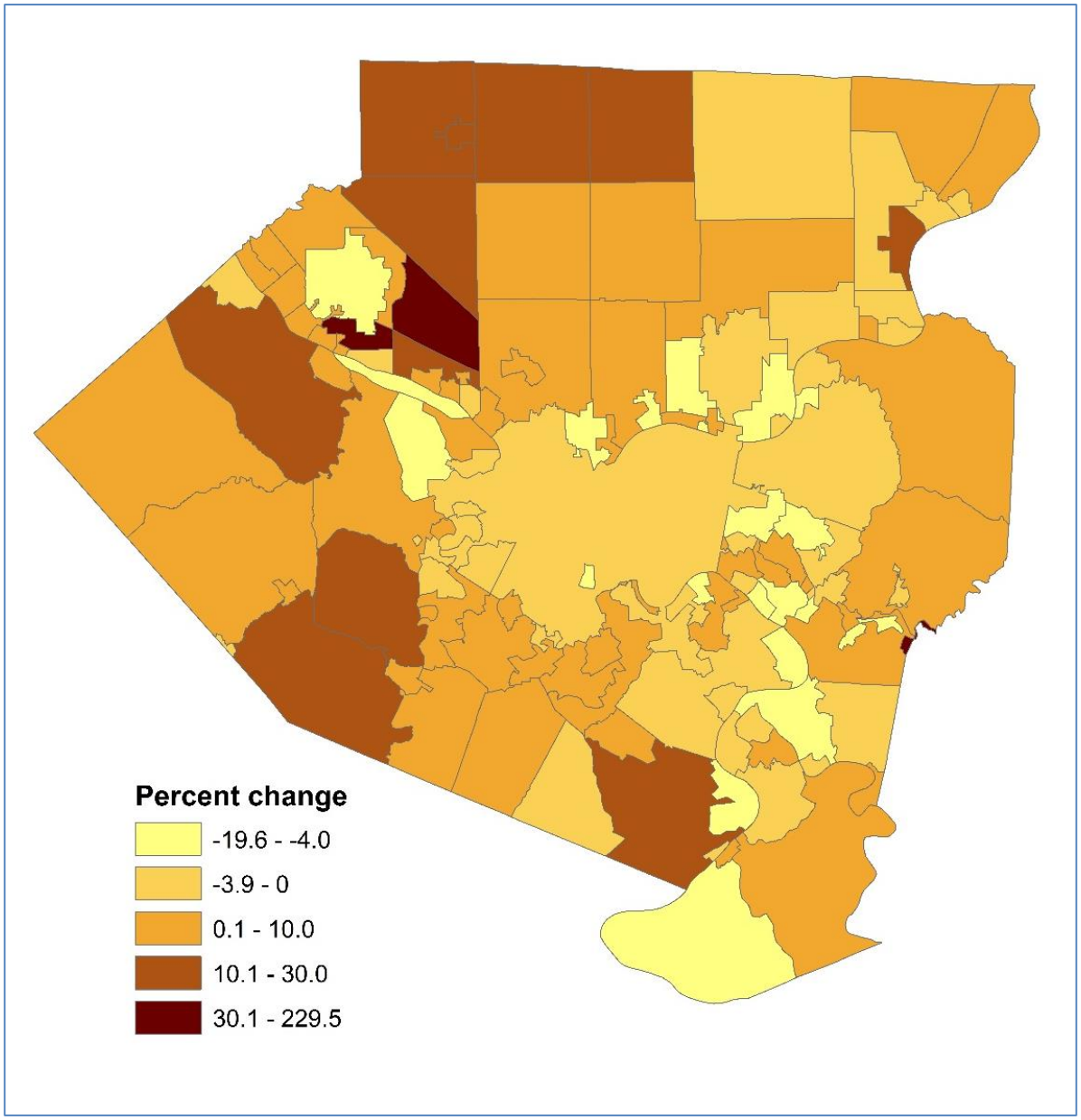


Figure 15-2 display the population change by municipality. Suburbs near the edges of the county are experiencing the most growth. Many communities along the river valleys are experencing population loss.

Figure 15-2. Population Change by Municipality for Allegheny County



15.2. Population Demographics

Population demographic maps were created using EJScreen, an environmental justice geographic assessement tool. These maps illistrate the percentage of the the population in a neighborhood that fit the selected criteria. These calculations were derived from the Census Bureau's American Community Survey 2008-2012. Percent Minority is calculated as percent minority as a fraction of population where minority is defined as all but Non- Hispanic White Alone. Percent over 64 is calculated as percent of individuals over 64 as a fraction of the population. Percent under age five is calculated as percent of individuals under age five as a fraction of the population. The demographic index is a combination of percent low income and percent minority which are consistent factors for Environmental Justice Areas.

Figures 15-3 through 15-6 show maps for selected demographic groups for Allegheny County and vicinity. The Lawrenceville monitor is also shown as the blue marker near the center of the maps.

Figure 15-3. Percent Minority, 2008-2012

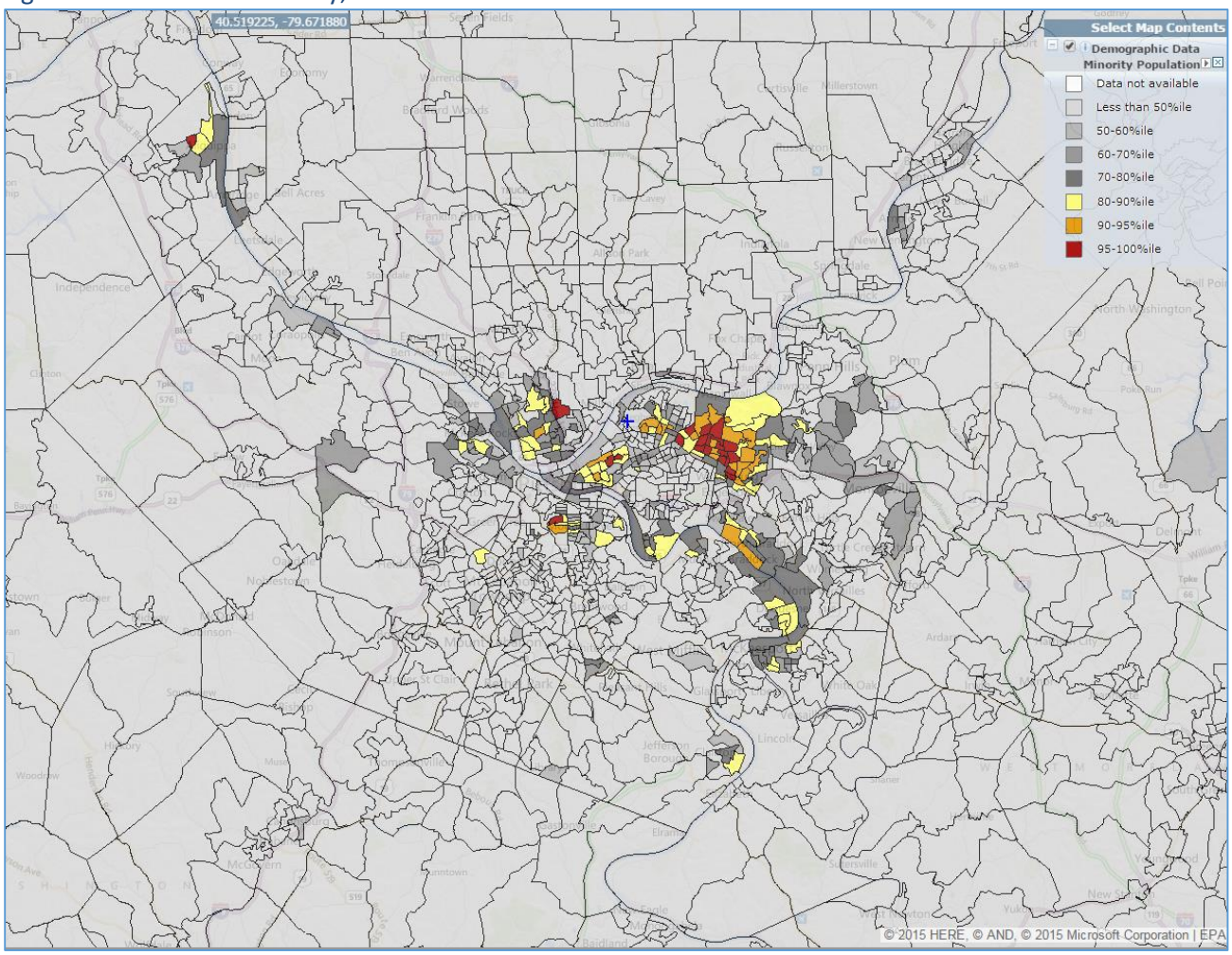


Figure 15-4. Percent over 65 Years Old, 2008-2012

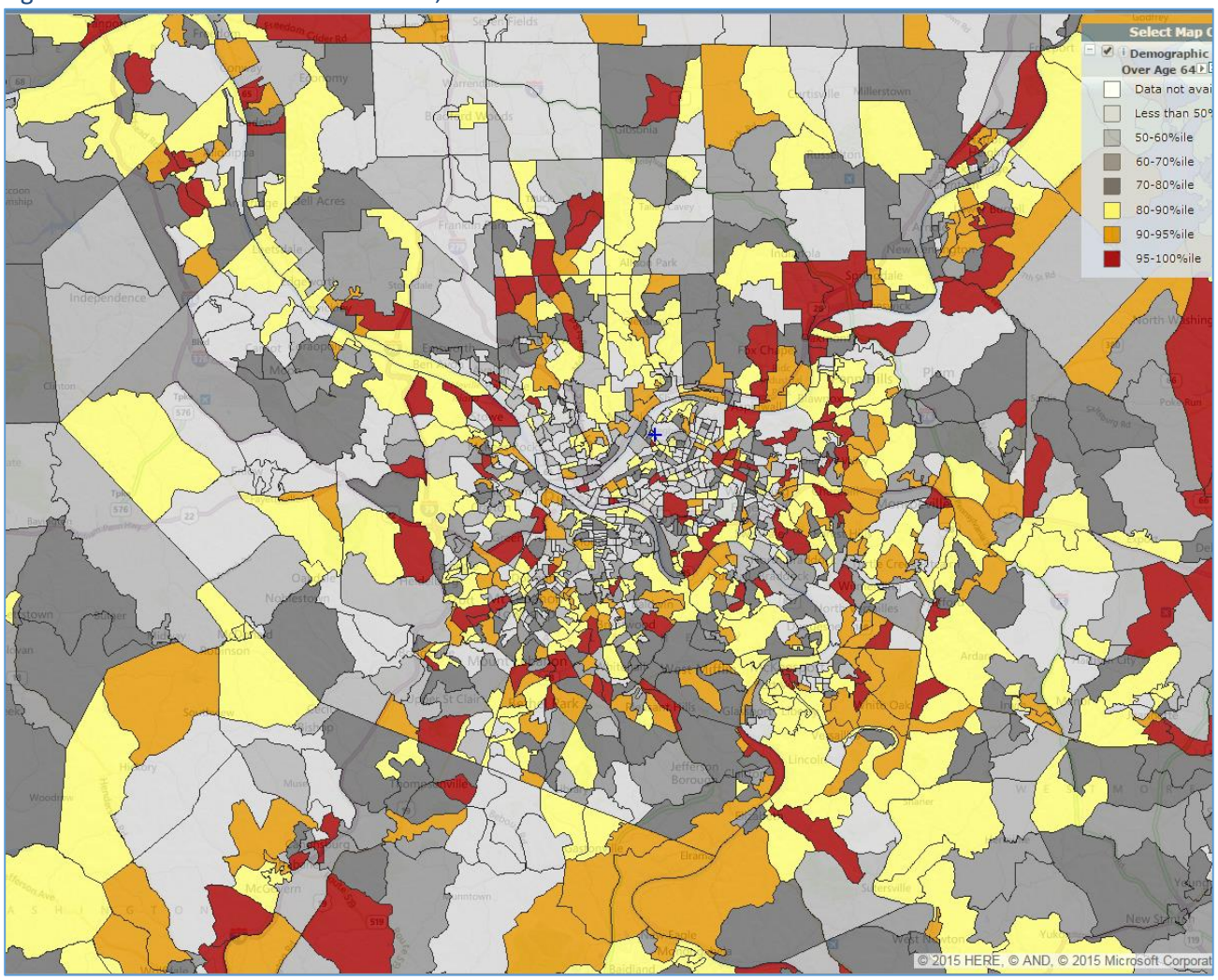


Figure 15-5. Percent Under Five Years Old, 2008-2013

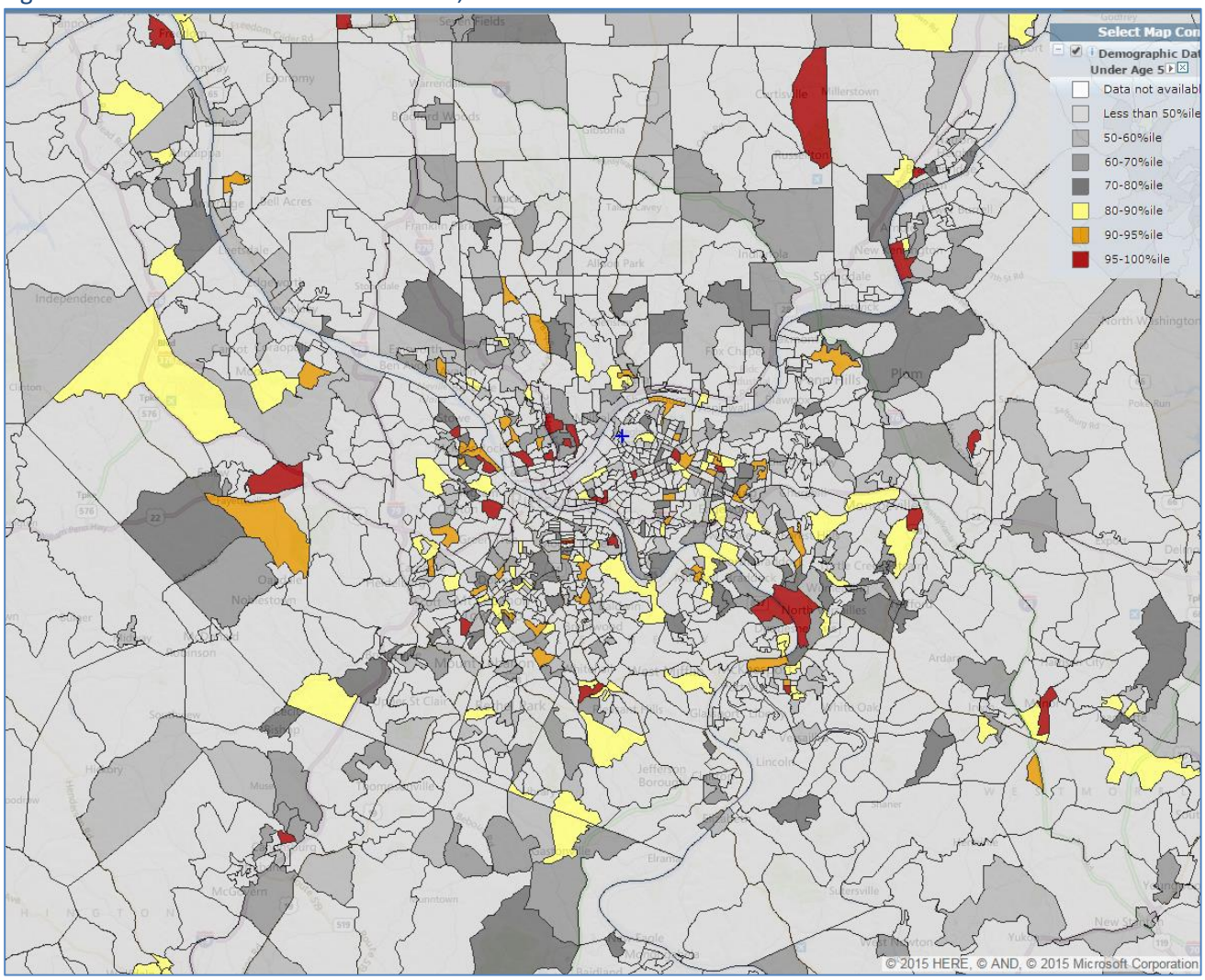
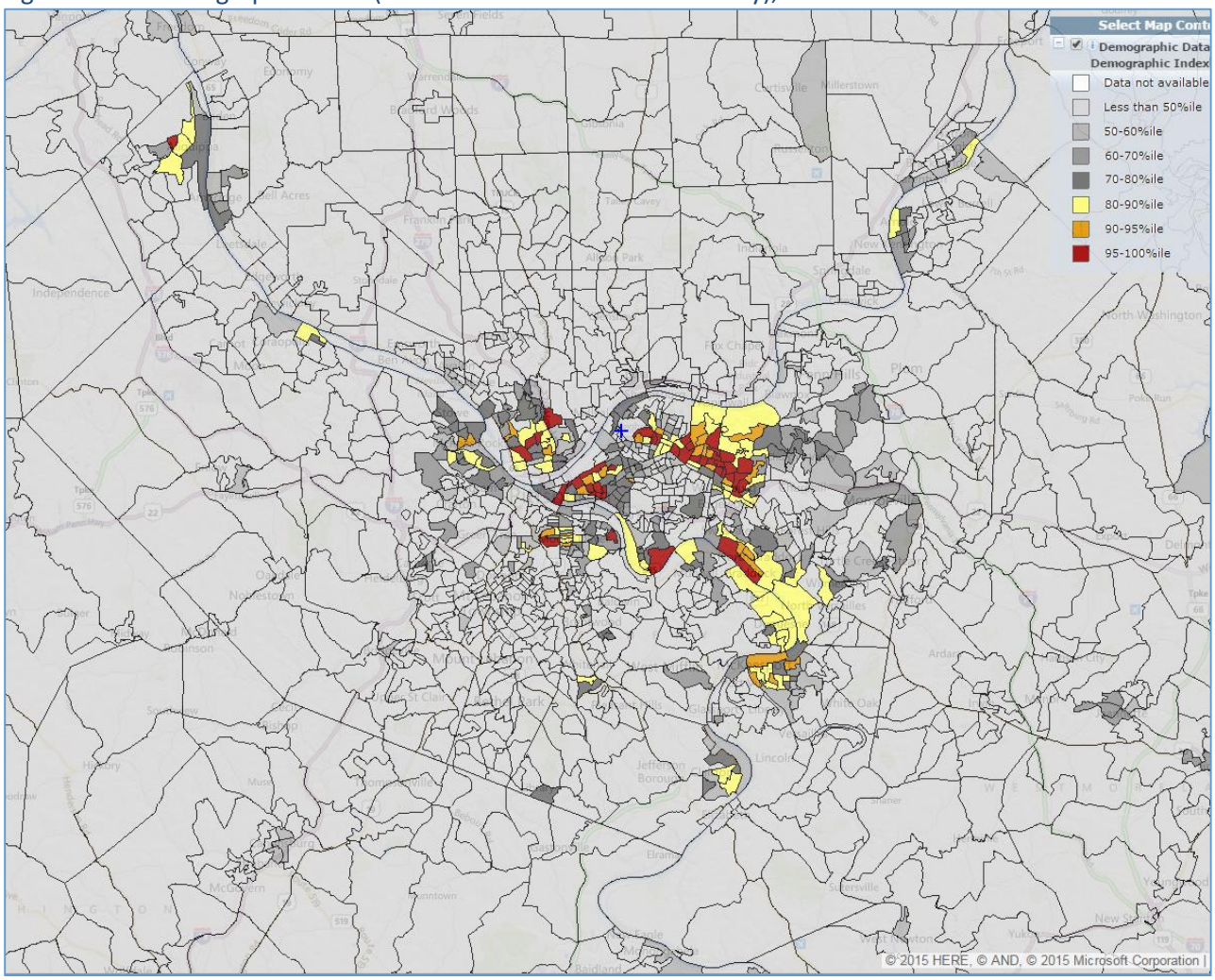


Figure 15-6. Demographic Index (Low Income and Percent Minority), 2008-2012



Characterizing air quality where sensitive groups are is an important objective of the monitoring network. In general, ACHD has a dense network for all pollutants but must also continue to serve sensitive and at-risk groups of our population.

16. Air Quality Index

The Air Quality Index (AQI) is used an hourly indicator for air quality for Pittsburgh and vicinity. Table 16-1 below shows a chart of the ranges used for AQI reporting.

Table 16-1. AQI Ranges and Health Concerns

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	*...air quality conditions are:*	*...as symbolized by this color:*
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

AQI values are uploaded hourly to the ACHD Air Quality web site as well as EPA's AirNow web site. Daily AQI and forecast summaries are also provided via voice message at ACHD's AQI number: 412-578-8179.

AQI summaries are also calculated on EPA's Air Quality System (AQS) for final official data. Table 16-2 below shows a chart of AQI values by category for 2010-2014.

Table 16-2. AQI Days by Category, 2010-2014

Year	Good Days	Moderate Days	Unhealthy for Sensitive Group Days	Unhealthy Days
2010	146	163	48	8
2011	176	156	30	3
2012	136	183	46	1
2013	175	175	15	0
2014	169	179	16	1

Currently, only $PM_{2.5}$ and ozone data are reported to AirNow from ACHD's polling system. More pollutants may be uploaded in the future to provide more public knowledge of ambient air quality conditions.

17. Conclusions

ACHD operates and maintains a robust monitor network within Allegheny County. Analysis shows that area and population are adequately served according to pollutant objectives. No eminent changes are required to the network at this time.

Several sites demonstrate importance based on the number of pollutants monitored and monitoring objectives. These monitors can also be part of larger national EPA networks such as NCore. Key multi-pollutant sites are shown below in Table 17-1.

Table 17-1. Key Multi-Pollutant Sites

Site	Pollutants	Objective(s)
Avalon	$PM_{2.5}$, PM_{10}, SO_2, toxics	High concentration, population exposure
Lawrenceville	CO, SO_2, NO_y, O_3, $PM_{2.5}$, $PM_{2.5}$ Speciation, PM_{coarse}, Pb	NCore, population exposure, urban IMPROVE
Liberty	$PM_{2.5}$, $PM_{2.5}$ Speciation, PM_{10}, SO_2, toxics	High concentration, population exposure
Parkway East	CO, NO_2, $PM_{2.5}$(planned)	Near-Road
South Fayette	$PM_{2.5}$, PM_{10}, SO_2, O_3	Background/transport

Evaluations of recent discontinuations and additions to the monitor network were found to be appropriate and justified. These included revisions to the Pb, NO_2, and CO networks in order to better serve the county according to revised monitoring objectives.

Additional revisions to the monitoring network can include continued shifts from filter-based particulate monitors to newer continuous methods, if equivalent. PM_{10} monitors may also be better served by $PM_{2.5}$ at some locations, since $PM_{2.5}$ is the fraction of greater concern and with concentrations closer to the NAAQS.

Suggested revisions to the network based on this assessment include the following:

- Lawrenceville Pb is no longer required as an area-wide monitor (or as part of the NCore network) and may be considered for discontinuation. Concentrations are low for this monitor compared to the NAAQS. Retention of this monitor may be desirable for comparison to historical data.
- Flag Plaza may be better served by $PM_{2.5}$ in place of PM_{10} for particulates in the Pittsburgh Central Business District. This could involve installation of a new FEM monitor or switching the inlet of the current PM_{10} TEOM to $PM_{2.5}$.
- Monroeville PM_{10} shows low importance to the network and can be discontinued. Roadway particulate surveillance will be better served by the future Parkway East Near-Road $PM_{2.5}$.

Additional SO_2 monitors, if needed to demonstrate attainment, would help validate modeled results for specific areas. Additional meteorological monitors would also help in the understanding of microscale meteorology and modeling throughout Allegheny County.

Additional Information

For more information concerning Allegheny County air quality data, contact the ACHD Air Quality Program, Planning and Data Analysis Section. Information can be found at the following: http://www.achd.net/air/index.php

For information concerning Pennsylvania Air Quality, visit: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/default.htm

For information about national air quality, visit EPA's website: www.epa.gov

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APPENDIX

Air Monitoring Network Description

The following air monitoring network description discusses each monitoring site in detail. This information is also contained in the 2015 Annual Network Review. The first information block is labeled with the site name. Inside of the block is listed site specific information as follows:

- **Street Address**
- **AQS #** - unique 9 digit number used to identify the site in the national data base.
- **Municipality** where site is located.
- **MSA**- Metropolitan Statistical Area.
- **Elevation**- Feet above mean sea level.
- **Latitude (N), Longitude (W)** – Site coordinates, given in WGS84 datum coordinates as taken from Google Earth.
- **Comments**- Specific site information of importance.

The next blocks are designed to list details of each monitor at the site. Each monitor present at the time of the review is assigned its own block. The following information is listed:

Sensor Type – The name of the pollutant measured by the sampler.

Sensor Network Designation – The name of the designated network:

- SLAMS - State or Local Ambient Monitoring Station
- STN – PM2.5 Speciation Trends Network
- SPM – Special Purpose Monitor
- NATTS- National Air Toxics Trends Site
- NCORE – National Core Multi-pollutant Monitoring
- QA CO-LOCATED – Quality Assurance Duplicate Monitoring

Sensor Purpose Description– The purpose of the sensor:

- Population Exposure, such as the Air Quality Index
- Regulatory Compliance with Federal or State regulation
- Research/Scientific Monitoring
- Specific Location Characterization
- Quality Assurance (Collocated)

Sample Frequency – Specifies how often a sample is taken.

- Continuous - operates 24/7; applies predominately to gaseous analyzers, although some particulate samplers (TEOM, BAM) operate continuously.
- Daily – a discrete sample is taken every day; applies to manual method particulate samplers.
- Every Third Day - Manual method particulate samplers that run every third day.
- Every Sixth Day – Manual method particulate samplers that run every sixth day.

Appendix A QA Assessment – A "**YES**" indicates the sensor is maintained in accordance with the Quality Assurance (QA) requirements specified in 40 CFR Part 58 Appendix A.

Appendix C Monitoring Classification – Each ambient air monitor is classified using the EPA "List of Designated Reference and Equivalent Methods"

- Reference Method – a method of sampling that is specified in 40 CFR Part 50.
- Equivalent Method – a method that is designated as equivalent to the reference method, in accordance with 40 CFR Part 53.
- Automated – after sampling, the analysis results are available immediately.
- Manual - after sampling, a separate analysis at a laboratory is necessary.
- N/A – appears where there is no reference or equivalent method.

Appendix C Monitoring Method – Each ambient air monitor is classified by a specific "method number." These numbers can be found in the EPA "List of Designated Reference and Equivalent Methods"

For detailed descriptions of each method number listed in this review, please follow the link below to access the EPA's Technology Transfer Network (file size 492 kb).

http://www.epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf

Monitoring Method Description – Each individual ambient air monitor type has a specific method of pollutant detection. Common examples are:

- Ozone monitors – Ultraviolet (UV) Absorption
- SO_2- UV Fluorescence
- CO - Non-dispersive Infrared (IR)
- NO_2, NO_x and NO_y - Chemiluminescence
- $PM_{2.5}$, PM_{10} - Gravimetric (gravimetric by TEOM tapered element microbalance, beta particle attenuation by BAM)
- Gas Chromatograph- Portable instrument that uses gas separation technology and a carrier gas of high purity nitrogen. The photo ionization detector is capable of low ppb levels of detection. Used by the Air Quality Program to continuously monitor for benzene at the Liberty site.
- Aethalometer – Continuous monitor that uses light attenuation and a specific wavelength (880 nm) to quantify diesel mobile emissions as black carbon particles and at an additional wavelength (370 nm) to differentiate and subtract positive signals from aromatic organic compounds such as those found in biomass burning, cooking and tobacco smoke.

Appendix D Design Criteria – Appendix D requires a certain number of samplers per geographic area. A "**YES**" indicates that the number of monitors in that particular area meets or exceeds the requirement of 40 CFR Part 58 Appendix D.

Appendix D Scale – The specific "spatial scales of representation" describes the physical dimensions of the air parcel around the monitoring station throughout which actual pollutant concentrations are reasonably similar.

- Microscale - Areas ranging from several meters to about 100 meters
- Middle scale - Areas ranging from 100 meters to 0.5 kilometers
- Neighborhood - 0.5 to 4.0 kilometers, and uniform land use
- Urban scale - 4 to 50 kilometers, and
- Regional - ten to hundreds of kilometers

Appendix D Objective – Describes the purpose/objective for monitoring at a site.

- Extreme Downwind
- General/Background Concentration
- Highest Concentration
- Maximum Ozone Concentration
- Maximum Precursor Emissions
- Population Exposure
- Regional Transport
- Source Oriented
- Quality Assurance
- Welfare Related

Appendix E Siting Criteria – Describes certain criteria applicable to ambient air quality sampling probes and monitoring paths, such as distances from trees, obstructions, traffic lanes, etc. A "**YES**" indicates that the sensor at the given site meets or exceeds the requirements of 40 CFR Part 58 Appendix E.

Detailed Air Monitoring Site Tables

Lawrenceville

Address	Allegheny County Health Department 301 39th Street Pittsburgh, PA		
AQS#	42-003-0008	MSA	Pittsburgh
Municipality	Pittsburgh	Elevation	280 m
Latitude (N)	40°27'55.56	Longitude (W)	79°57'38.67
Established	03/01/1966	Probe Height	12 m
Comments	This is a population-based, community oriented monitoring site that is located in an urban area, downwind of Central Business District. The Lawrenceville monitoring site was selected as a PM2.5 National Trends Site, and later as an NCORE site. The most significant local pollution is generated from mobile sources, but light industry scattered throughout the area is also a contributing factor. Lawrenceville is a core PM2.5 site that is used to determine compliance with national standards.		

Sensor Type	**Ozone**	Appendix C Method Code	EQOA-0880-047
Network Designation	SLAMS	Method Description	UV Absorption
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Lawrenceville, Continued

Sensor Type	**Oxides of Nitrogen**	Appendix C Method Code	RFNA-0691-082
Network Designation	SLAMS	Method Description	Chemiluminescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	TEOM (non-equivalent)
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{10-2.5}$ (coarse)**	Appendix C Method Code	EQPM-0709-185
Network Designation	NCORE / SPM	Method Description	Beta Attenuation Monitors
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method for PM coarse monitoring	Appendix E Siting Criteria	Yes

Lawrenceville, Continued

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Daily	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every six days	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure / Quality Assurance
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$ Speciation**	Appendix C Method Code	N/A (Met One SASS +URG3000n)
Network Designation	CSN	Method Description	Gravimetric
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Appendix C Classification	N/A	Appendix E Siting Criteria	Yes

Lawrenceville, Continued

Sensor Type	**Carbon Monoxide Trace Level**	Appendix C Method Code	RFCA-1093-093
Network Designation	NCORE	Method Description	Non-dispersive Infrared
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Appendix C Classification	Automated Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide Trace Level**	Appendix C Method Code	EQSA-0495-100
Network Designation	NCORE	Method Description	UV-Fluorescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Appendix C Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Sensor Type	**Total Oxides of Nitrogen (NOy)Trace Level**	Appendix C Method Code	N/A T-API 200EU/501NOy
Network Designation	NCORE / SPM	Method Description	Chemiluminescence
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Appendix C Classification	N/A	Appendix E Siting Criteria	Yes

Lawrenceville, Continued

Sensor Type	**Lead (Pb)**	Appendix C Method Code	FRL-1087-001
Network Designation	SLAMS	Method Description	Gravimetric and Lead analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method 40 CFR Part 50, Appendix G	Appendix E Siting Criteria	Yes

Sensor Type	**Lead (Pb)**	Appendix C Method Code	FRL-1087-001
Network Designation	SLAMS	Method Description	Gravimetric and Lead analysis
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure / Quality Assurance
Monitor Classification	Manual Reference Method 40 CFR Part 50, Appendix G	Appendix E Siting Criteria	Yes

Sensor Type	**TSP / HAP Metals**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	Gravimetric and Metals Analysis By W Va. DEP's Laboratory
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Lawrenceville Area Information

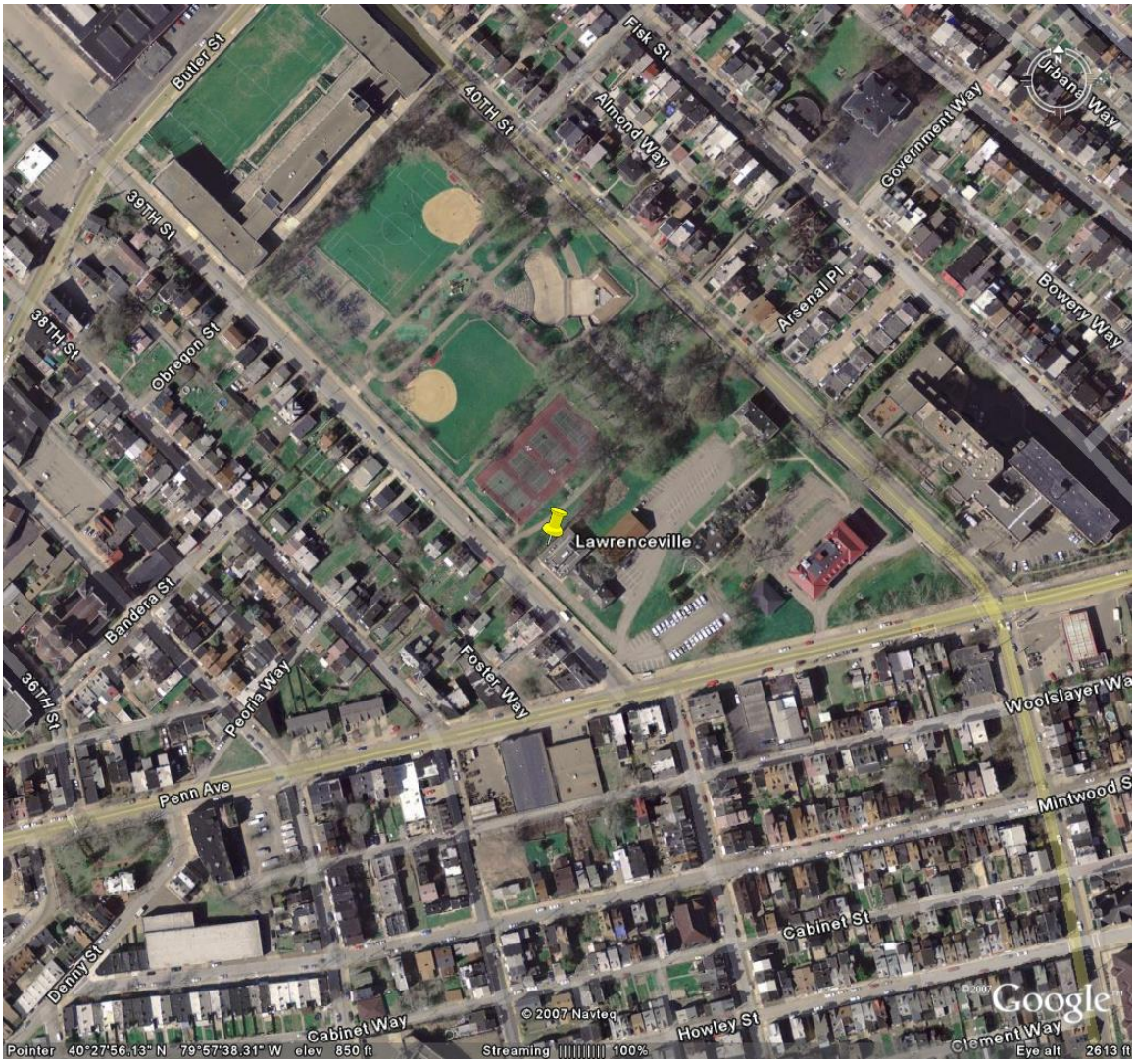
Street Name	Traffic Count (Vehicles/day)
39th Street (20 m)	Unavailable
Penn Avenue (86 m)	13,000
Butler Street (343 m)	14,799

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South	Wall	1	2 to 3 m
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Flat
South		Flat
West		Flat

Lawrenceville Location Map



Liberty

Address	South Allegheny High School 2743 Washington Blvd McKeesport, PA		
AQS#	42-003-0064	MSA	Pittsburgh
Municipality	Liberty	Elevation	335 m
Latitude (N)	40°19'25.88	Longitude (W)	79°52'5.03
Established	10/01/1969	Probe Height	4 m
Comments	This site is population oriented but is also about 3 km downwind of the US Steel Clairton Coke Works, which is a major source of particulate matter and precursor gases as well as sulfur dioxide and air toxics. The area around this monitoring site has a long history of higher than average levels of PM2.5, PM10 and sulfur dioxide. Significant ambient levels of benzene have also been measured and documented at this site. Liberty is a core PM2.5 site that is used to determine compliance with national standards. At the request of US Steel, telemetry devices have been installed on the PM_{10}, $PM_{2.5}$, SO_2, H_2S monitors that transmit continuous readings via radio signals to a location within the US Steel facility. Other transmitters are also in use at Lincoln PM10 and PM2.5 monitors (site # 8.3), Glassport High Street PM10 monitor (site # 8.4) and North Braddock SO2 monitor and sonic anemometer. This real-time data allows US Steel to minimize fugitive emissions and to adjust production levels to keep particulate levels and gaseous emissions within allowable ambient levels in downwind communities.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	TEOM (non-equivalent)
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Liberty, Continued

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Daily	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Quality Assurance
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}**	Appendix C Method Code	EQPM-1090-079
Network Designation	SLAMS	Method Description	TEOM
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Liberty, Continued

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1087-062
Network Designation	SLAMS	Method Description	Gravimetric and B(a)P analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1087-062
Network Designation	SLAMS	Method Description	Gravimetric and B(a)P analysis
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure / Quality Assurance
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	EQAS-0193-092
Network Designation	SLAMS	Method Description	UV-Fluorescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Liberty, Continued

Sensor Type	**$PM_{2.5}$ Speciation**	Appendix C Method Code	N/A (Met One SASS +URG3000n)
Network Designation	CSN	Method Description	Gravimetric
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Appendix C Classification	N/A	Appendix E Siting Criteria	Yes

Sensor Type	**Hydrogen Sulfide**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	ML8850 with converter
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Sensor Type	**Charcoal Tube (BTEX, Naphthalene)**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	Sorbent Tube / Lab Analysis
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Liberty Area Information

Street Name	Traffic Count (Vehicles/day)
Washington Blvd. (283 m)	2800

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	valley	Rolling
East		Rolling
South	valley	Rolling
West		Rolling

Liberty Location Map

Lincoln

Address	Bellbridge Road Lincoln, PA		
AQS#	42-003-7004	MSA	Pittsburgh
Municipality	Lincoln	Elevation	346 m
Latitude (N)	40°18'29.80	Longitude (W)	79°52'8.77
Established	09/15/1992	Probe Height	3 m
Comments	Located at an elevated location, directly across the Monongahela River and downwind from the US Steel Clairton Coke Works. Although this area is not populated, it is upwind of populated areas and it is modeled to be the maximum impact area of air emissions from the plant. At the request of US Steel, telemetry devices have been installed on the PM_{10} and $PM_{2.5}$ monitors that transmit continuous readings via radio signals to a location within the US Steel facility. This real-time data allows US Steel to minimize fugitive emissions and to adjust production levels to keep particulate levels and gaseous emissions within allowable ambient levels in downwind communities.		

Sensor Type	**PM_{10}**	Appendix C Method Code	EQPM-1090-079
Network Designation	SLAMS	Method Description	TEOM
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Middle
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	TEOM (non-equivalent)
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Lincoln Area Information

Street Name	Traffic Count (Vehicles/day)
Lincoln Blvd. (238 m)	6900
Bellbridge Rd. (428 m)	2754

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Industrial
West	Industrial

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Valley	Rolling
East	Valley	Rolling
South	Hills	Rough
West	River	Rough

Lincoln Location Map

Glassport High Street

Address	Water Tower on High Street Glassport, PA		
AQS#	42-003-3006	MSA	Pittsburgh
Municipality	Glassport	Elevation	366 m
Latitude (N)	40°19'33.67	Longitude (W)	79°52'54.29
Established	04/30/1991	Probe Height	1.5 m
Comments	Located in a residential area, this site is population oriented, and is impacted by the US Steel Clairton Coke Works, the Irvin Works and other sources in the Monongahela river valley. Glassport High Street is the site of the County's last documented exceedance of the federal 24-hour PM_{10} standard of 150 ug/m^3 (October of 1997). At the request of US Steel, a telemetry device has been installed on the PM_{10} monitor that transmits continuous readings via radio signals to a location within the US Steel facility. This real-time data allows US Steel to minimize fugitive emissions and to adjust production levels to keep particulate levels and gaseous emissions within allowable ambient levels in downwind communities.		

Sensor Type	**PM_{10}**	Appendix C Method Code	EQPM-1090-079
Network Designation	SLAMS	Method Description	TEOM
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Glassport High Street Area Information

Street Name	Traffic Count (Vehicles/day)
High Street (8m)	Unavailable
Scenic Street (53m)	Unavailable
Washington Blvd (140m)	2800
Naoami Ave. (202m)	4458

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North	Water Tower	25	9
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Flat
South		Flat
West		Flat

Glassport High Street Location Map

Liberty, Lincoln and Glassport High Street Location Map

North Braddock

Address	North Braddock Borough Building 600 Anderson Street Braddock, PA		
AQS#	42-003-1301	MSA	Pittsburgh
Municipality	North Braddock	Elevation	270 m
Latitude (N)	40°24'8.16	Longitude (W)	79°51'39.39
Established	01/01/1973	Probe Height	5 m
Comments	This site is population oriented and it is located within an urban environmental justice area. The population around this site is impacted by the US Steel Edgar Thomson Works, which is a large steel production facility, and is located about 1.5 km away from the monitoring site. North Braddock is a core PM2.5 site that is used to determine compliance with national standards. At the request of US Steel, telemetry devices have been installed on the PM_{10} and SO_2 monitors as well as the sonic anemometer. Continuous data is transmitted via radio signals to a location within the US Steel facility. This real-time data allows US Steel to minimize fugitive emissions and to adjust production levels to keep particulate levels and gaseous emissions within allowable ambient levels in downwind communities.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

North Braddock, Continued

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1087-062
Network Designation	SLAMS	Method Description	Gravimetric and B(a)P analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1087-062
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	QA/Co-located Monitor	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure / Quality Assurance
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}**	Appendix C Method Code	EQPM-0798-122
Network Designation	SLAMS	Method Description	Beta Attenuation Monitor
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

North Braddock, Continued

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	EQAS-0193-092
Network Designation	SLAMS	Method Description	UV-Fluorescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

North Braddock Area Information

Street Name	Traffic Count (Vehicles/day)
Bell Avenue (13 m)	3242
Anderson St. (40 m)	4455
Braddock Ave. (370 m)	11,436

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential, Industry
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Hills	Rolling
East	Hills	Rolling
South	River	Rolling
West		Rolling

North Braddock Location Map

Harrison 2

Address	Highlands Senior High School Pacific & Idaho Streets Natrona, PA		
AQS#	42-003-1008	MSA	Pittsburgh
Municipality	Harrison Township	Elevation	1020 feet above MSL
Latitude (N)	40°36'49.91	Longitude (W)	79°43'46.45
Established	01/01/1999	Probe Height	5.5 m
Comments	This site is located within 1 km of the Harrison ozone monitoring station, and it is population-based and community oriented. Harrison 2 is a core PM2.5 site that is used to determine compliance with national standards.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**Ozone**	Appendix C Method Code	EQOA-0992-087
Network Designation	SLAMS	Method Description	UV Absorption
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	No

Harrison 2, Continued

Sensor Type	**Oxides of Nitrogen**	Appendix C Method Code	RFNA-0691-082
Network Designation	SLAMS	Method Description	Chemiluminescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Reference Method	Appendix E Siting Criteria	No

Harrison 2 Area Information

Street Name / Distance	Traffic Count (Vehicles/day)
Idaho Ave (31m)	Unavailable
Pacific Ave (103m)	4458

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Industrial

Direction	Obstructions	Height (m)	Distance (m)
North	Wall	3	20
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Flat
South	Valley	Rolling
West	Valley	Rolling

Natrona Lead

Address	79 North Canal Street Natrona, PA		
AQS#	42 003 1009	MSA	Pittsburgh
Municipality	Natrona	Elevation	775 feet above MSL
Latitude (N)	40°37'8.10	Longitude (W)	79°43'9.83
Established	01/01/2010	Probe Height	1.5 m
Comments	A newer site established as a requirement of updated national lead standards. Air Quality Program modeling showed this location to be close to the modeled lead hot spot due to impact by Allegheny Ludlum Corp.		

Sensor Type	**Lead (Pb)**	Appendix C Method Code	FRL-1087-001
Network Designation	SLAMS	Method Description	Gravimetric and Lead analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Microscale
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Classification	Manual Reference Method 40 CFR Part 50, Appendix G	Appendix E Siting Criteria	Yes

Natrona Area Information

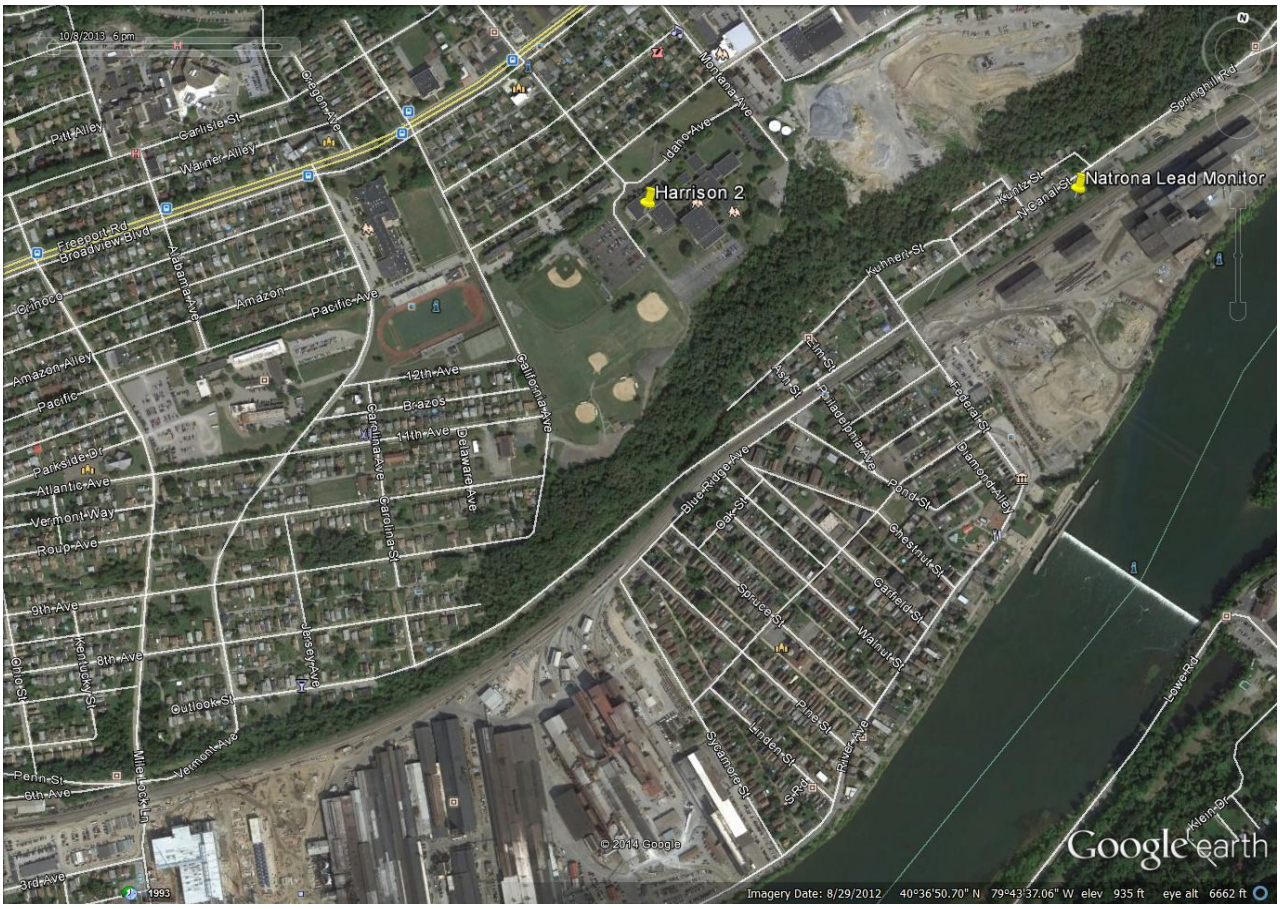
Street Name / Distance	Traffic Count (Vehicles/day)
North Canal Street (19m)	5504

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Industrial
South	Industrial
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North	House	4	10
East			
South			
West	Garage	2	5

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Hill	Rolling
East		Flat
South		Flat
West		Flat

Harrison 2 and Natrona Lead Locations Map



South Fayette

Address	South Fayette Elementary School 2254 Old Oakdale Road McDonald, PA		
AQS#	42-003-0067	MSA	Pittsburgh
Municipality	McDonald	Elevation	390 m
Latitude (N)	40°22'32.33	Longitude (W)	80°10'11.75
Established	01/01/1973	Probe Height	5.5 m
Comments	This is a population-based, community oriented site that is the regional transport site for ozone and PM2.5. Location in the western portion of the county makes this an excellent site to access pollution levels entering the County on prevailing winds. South Fayette is a core PM2.5 site that is used to determine compliance with national standards.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Regional
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background, Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

South Fayette, Continued

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1287-063
Network Designation	SLAMS	Method Description	Gravimetric and B(a)P analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Regional
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	EQAS-0193-092
Network Designation	SLAMS	Method Description	UV-Fluorescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Regional
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

South Fayette, Continued

Sensor Type	**Ozone**	Appendix C Method Code	EQOA-0880-047
Network Designation	SLAMS	Method Description	UV Absorption
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Regional
Appendix A QA Assessment	Yes	Appendix D Objectives	General/Background, Regional Transport
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

South Fayette Area Information

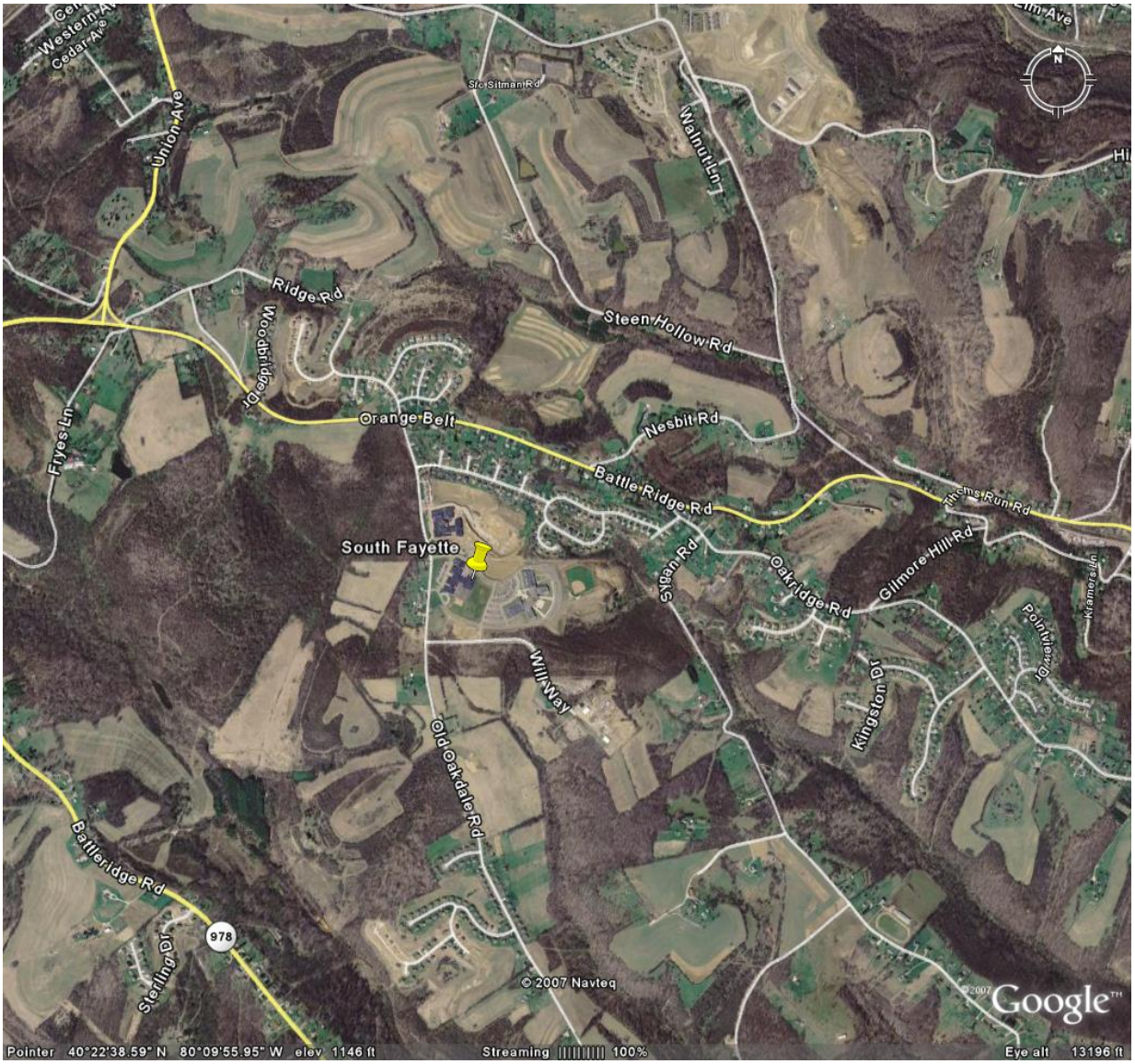
Street Name / Distance	Traffic Count (Vehicles/day)
Old Oakdale Rd. (142m)	Unavailable
Cannongate Dr. (377m)	Unavailable
Battle Ridge Rd. (554m)	2779

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Agriculture
West	Agriculture

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Rolling
East		Rolling
South		Rolling
West		Rolling

South Fayette Location Map



Clairton

Address	Clairton Education Center 501 Waddel St, Clairton, PA		
AQS#	42-003-3007	MSA	Pittsburgh
Municipality	Clairton	Elevation	297 m
Latitude (N)	40°17'39.77	Longitude (W)	79°53'7.09
Established	04/08/1992	Probe Height	4.5 m
Comments	This is a population-oriented site that is located within an environmental justice area. Site selection was based on this location being on the edge of the Monongahela Valley, generally upwind of the Clairton Coke Works. During times of temperature inversions and anomalous wind direction, the Coke Works and other sources in the Monongahela River valley impact this site.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SPM	Method Description	Gravimetric
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Welfare Concerns
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Clairton, Continued

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1087-062
Network Designation	SLAMS	Method Description	Gravimetric and B(a)P analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Welfare Concerns
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Clairton Area Information

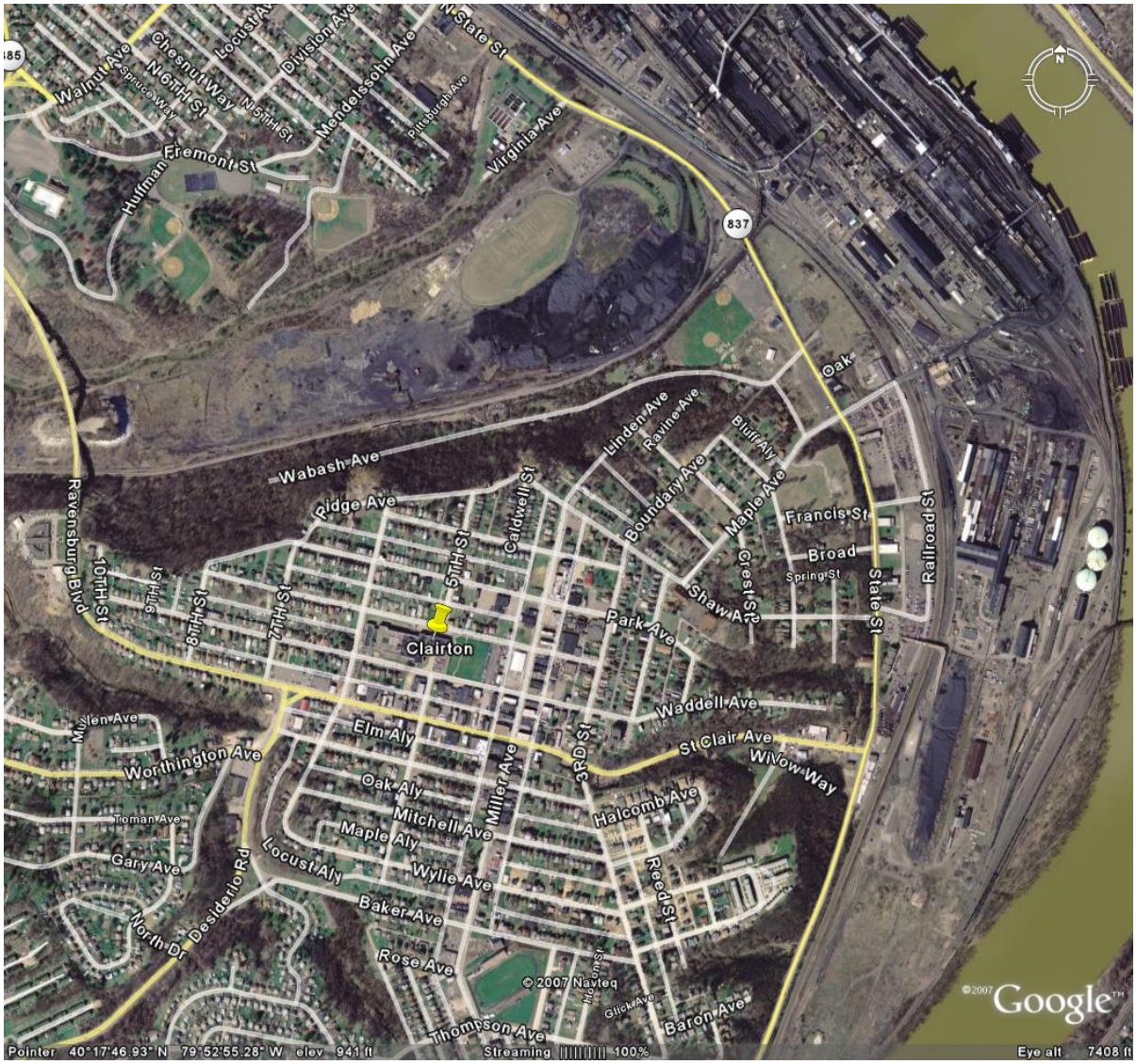
Street Name / Distance	Traffic Count (Vehicles/day)
Large Ave (29m)	Unavailable
Waddell Ave. (64m)	Unavailable
6th St. (144m)	Unavailable
Mullberry Alley (158m)	Unavailable

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Commercial
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	valley	rolling
East	valley	rolling
South		flat
West	valley	rolling

Clairton Location Map



Avalon

Address	530 Orchard Ave. Pittsburgh, PA		
AQS#	42-003-0002	MSA	Pittsburgh
Municipality	Avalon	Elevation	845 feet above MSL
Latitude (N)	40°29'59.24	Longitude (W)	80° 4'16.85
Established	02/01/1980	Probe Height	2.5 m
Comments	This site is population oriented and is impacted by sources on Neville Island, including Shenango Coke Works and Neville Chemical. Many air pollution and odor complaints received by the Department originate from the communities near this monitoring site. Avalon is a core PM2.5 site that is used to determine compliance with national standards.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Three Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Avalon, Continued

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	EQPM-0308-170
Network Designation	SPM	Method Description	Beta Attenuation Monitor
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1287-063
Network Designation	SLAMS	Method Description	Gravimetric and B(a)P analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**Sulfur Dioxide**	Appendix C Method Code	EQSA-0495-100
Network Designation	SLAMS	Method Description	UV-Fluorescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Avalon, Continued

Sensor Type	**Hydrogen Sulfide**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	EQSA-0495-100 with converter
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Hydrogen Sulfide	Appendix E Siting Criteria	Yes

Sensor Type	**Charcoal Tube (BTEX, Naphthalene**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	Sorbent Tube / Lab Analysis
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Avalon Area Information

Street Name / Distance	Traffic Count (Vehicles/day)
Spruce St. (7m)	Unavailable
Orchard Ave. (33m)	Unavailable
South Birmingham Ave. (50m)	Unavailable
Ohio River Blvd. (59m)	10,360

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Commercial
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North	Building	2	30
East	Building	4	20
South	Building	3	43
West	Building	4	15

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Hill	Rolling
East		Flat
South	River	Flat
West		Flat

Avalon Location Map

Flag Plaza

Address	Boy Scouts of America Building 1275 Bedford Avenue Pittsburgh, PA		
AQS#	42-003-0031	MSA	Pittsburgh
Municipality	Pittsburgh	Elevation	277 m
Latitude (N)	40°26'36.30	Longitude (W)	79°59'25.27
Established	01/01/1980	Probe Height	4 m
Comments	This is an urban-based monitoring site that is located on the edge of Central Business District. In respect to prevailing winds, it is positioned downwind of Central Business District and upwind of a densely populated environmental justice area.		

Sensor Type	**PM_{10}**	Appendix C Method Code	EQPM-1090-079
Network Designation	SLAMS	Method Description	TEOM
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Flag Plaza, Continued

Sensor Type	**Carbon Monoxide**	Appendix C Method Code	RFCA-1093-093
Network Designation	SLAMS	Method Description	Non-dispersive Infrared
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Reference Method	Appendix E Siting Criteria	Yes

Sensor Type	**Air Toxics**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	SUMMA canister, TO-15 analysis
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual SUMMA Canister Sampler	Appendix E Siting Criteria	Yes

Sensor Type	**Air Toxics**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	Carbonyl Cartridge, TO-11 analysis
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Carbonyl Cartridge Sampler	Appendix E Siting Criteria	Yes

Flag Plaza Area Information

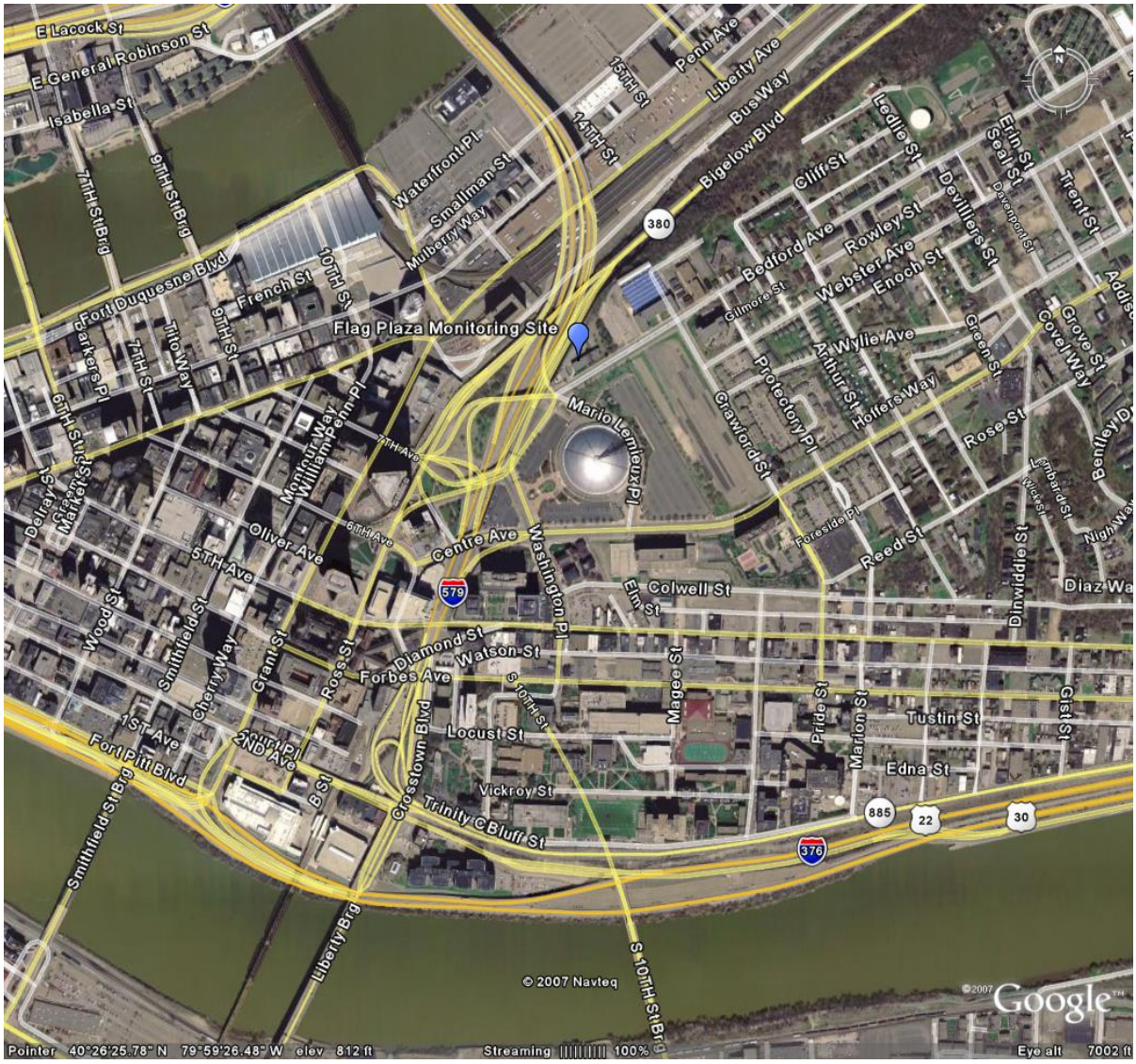
Street Name / Distance	Traffic Count (Vehicles/day)
Bedford Ave (17m)	9414
Rt. 579 (65m)	54,000
Rt. 380 (105m)	11,000

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Commercial
East	Residential
South	Commercial
West	Commercial

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West	Building	5	130

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	River	Flat
East	City	Flat
South	City	Flat
West	City	Flat

Flag Plaza Location Map



Pittsburgh 8 (Manchester School)

Address	Manchester Elementary School 1000 Fulton Street Pittsburgh, PA		
AQS#	42-003-0092	MSA	Pittsburgh
Municipality	Pittsburgh	Elevation	245 m
Latitude (N)	40°27'22.98	Longitude (W)	80° 1'35.10
Established	01/01/1981	Probe Height	4 m
Comments	Located to the northwest of downtown Pittsburgh, this site is population-based and community oriented. This is also an environmental justice area. Sources of influences are numerous, as this community is located near various warehouse/light-industrial facilities along Ohio River valley. There is also a significant contribution by mobile sources.		

Sensor Type	**PM_{10}**	Appendix C Method Code	RFPS-1287-062
Network Designation	SLAMS	Method Description	Gravimetric
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure, Welfare Concerns
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

Pittsburgh 8 Area Information

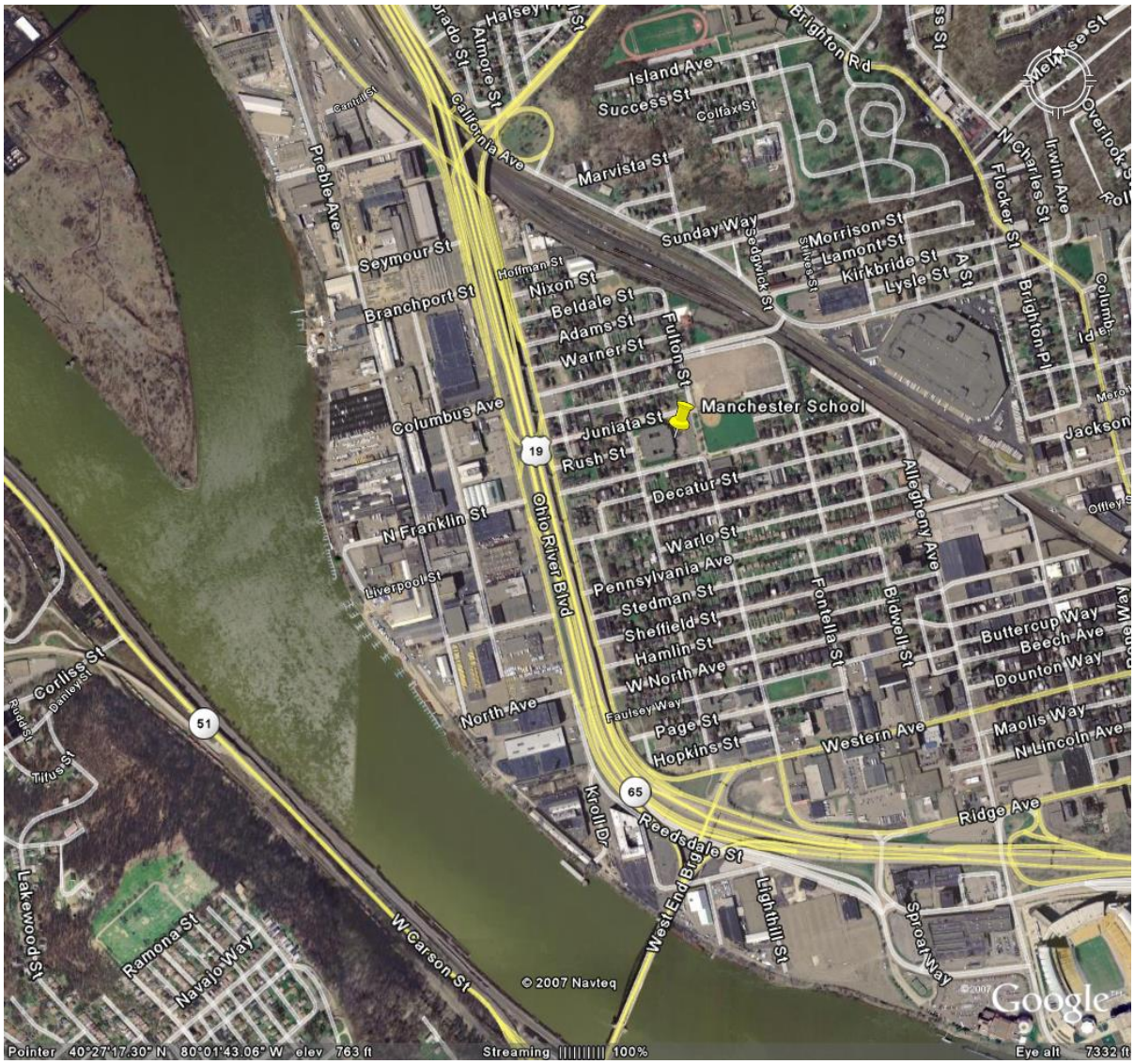
Street Name / Distance	Traffic Count (Vehicles/day)
Manhattan St (50m)	Unavailable
Chateau St (220m)	9000
Rt. 19 (253)	33,000

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East	Hills	Rolling
South		Flat
West	River	Flat

Pittsburgh 8 (Manchester School) Location Map



Downtown

Address	City County Building Grant Street Pittsburgh, PA		
AQS#	42-003-0038	MSA	Pittsburgh
Municipality	Pittsburgh	Elevation	236 m
Latitude (N)	40°26'18.13	Longitude (W)	79°59'48.48
Established	01/01/1973	Probe Height	2 m
Comments	This monitoring site is located in Central Business District and is impacted predominantly by mobile sources. The probe inlet is mounted in a street canyon, which has the potential to concentrate mobile emissions.		

Sensor Type	**Carbon Monoxide**	Appendix C Method Code	RFCA-0981-054
Network Designation	SLAMS	Method Description	Non-dispersive Infrared
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Middle
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Reference Method	Appendix E Siting Criteria	No

Downtown Area Information

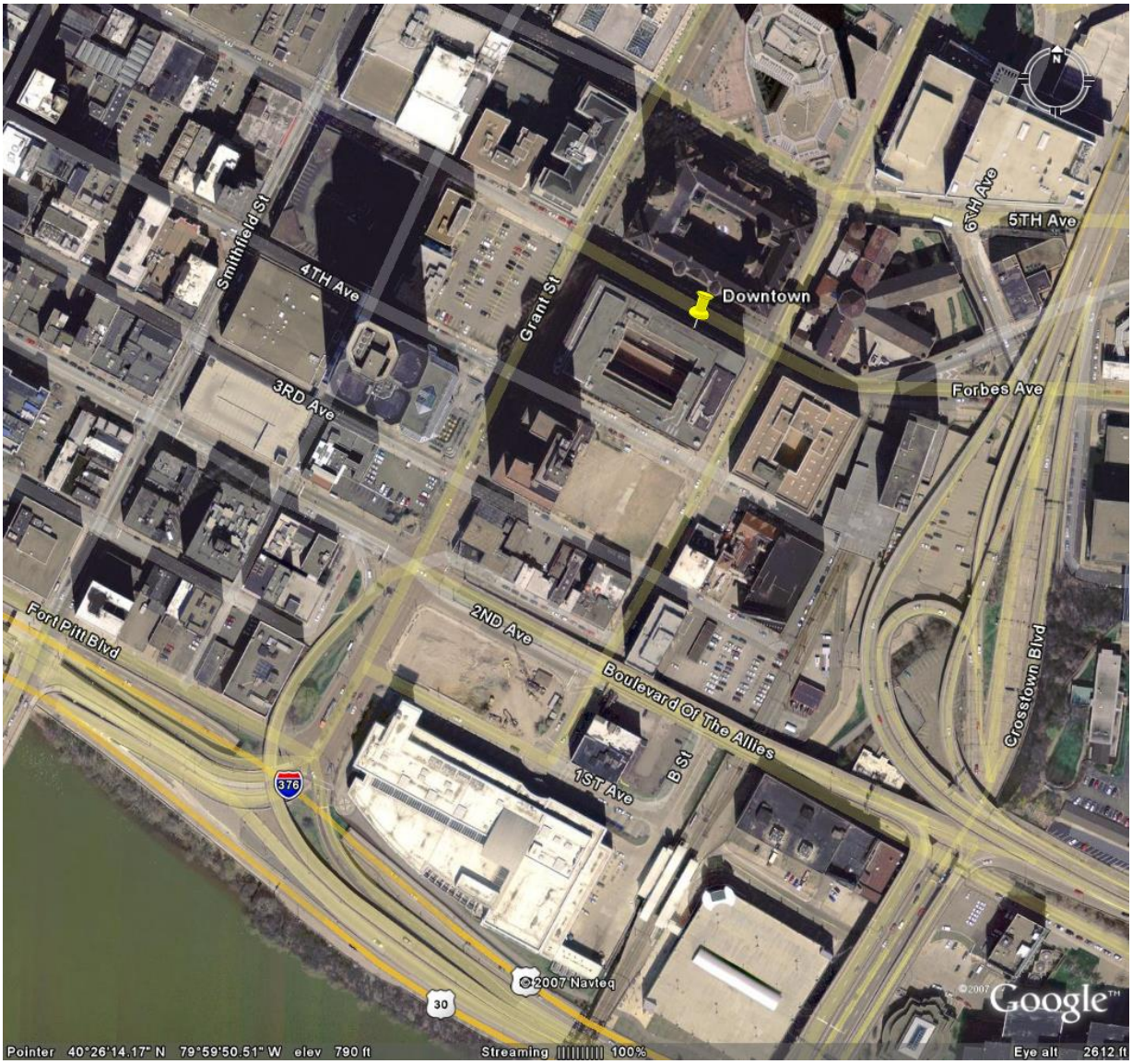
Street Name / Distance	Traffic Count (Vehicles/day)
Forbes Ave (4m)	14,000
Ross St. (40m)	12,391
Grant St (55m)	17,043

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Commercial
East	Commercial
South	Commercial
West	Commercial

Direction	Obstructions	Height (m)	Distance (m)
North	Building	15	27
East			
South	Building	25	2
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Street Canyon	Flat
East	City	Flat
South	Building	Flat
West	City	Flat

Downtown Location Map



North Park

Address	Golf course clubhouse roof Kummer Road North Park, PA		
AQS#	42-003-0093	MSA	Pittsburgh
Municipality	North Park	Elevation	373 m
Latitude (N)	40°36'23.68	Longitude (W)	80° 1'16.47
Established	01/01/1983	Probe Height	3.5 m
Comments	Located in the less populated northern portion of the County, this site was created as a PM2.5 background site and also to provide for even geographical distribution of the PM2.5 monitoring network.		

Sensor Type	**$PM_{2.5}$**	Appendix C Method Code	RFPS-0498-188
Network Designation	SPM	Method Description	Gravimetric
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Urban
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Manual Reference Method	Appendix E Siting Criteria	Yes

North Park Area Information

Street Name / Distance	Traffic Count (Vehicles/day)
Kummer Rd. (229m)	2850
Pearce Mill Rd. (580m)	2740

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Agriculture
East	Agriculture
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Rolling
East		Rolling
South		Rolling
West		Rolling

North Park Location Map

Bridgeville

Address	1311 Union Street Bridgeville PA		
AQS#	42 003 0070	MSA	Pittsburgh
Municipality	Bridgeville	Elevation	251 m
Latitude (N)	40°21'46.77	Longitude (W)	80° 6'7.67
Established	01/01/2010	Probe Height	1.5 m
Comments	Established as a requirement of updated lead standards. Air Quality Program modeling showed this location to be close to the modeled lead hot spot due to impact by G.E. Bridgeville Glass Corp.		

Sensor Type	**Lead (Pb)**	Appendix C Method Code	FRL-1087-001
Network Designation	SLAMS	Method Description	Gravimetric and Lead Analysis
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Every Six Days	Appendix D Scale	Microscale
Appendix A QA Assessment	Yes	Appendix D Objectives	Highest Concentration
Monitor Classification	Manual Reference Method 40 CFR Part 50, Appendix G	Appendix E Siting Criteria	Yes

Bridgeville Area Information

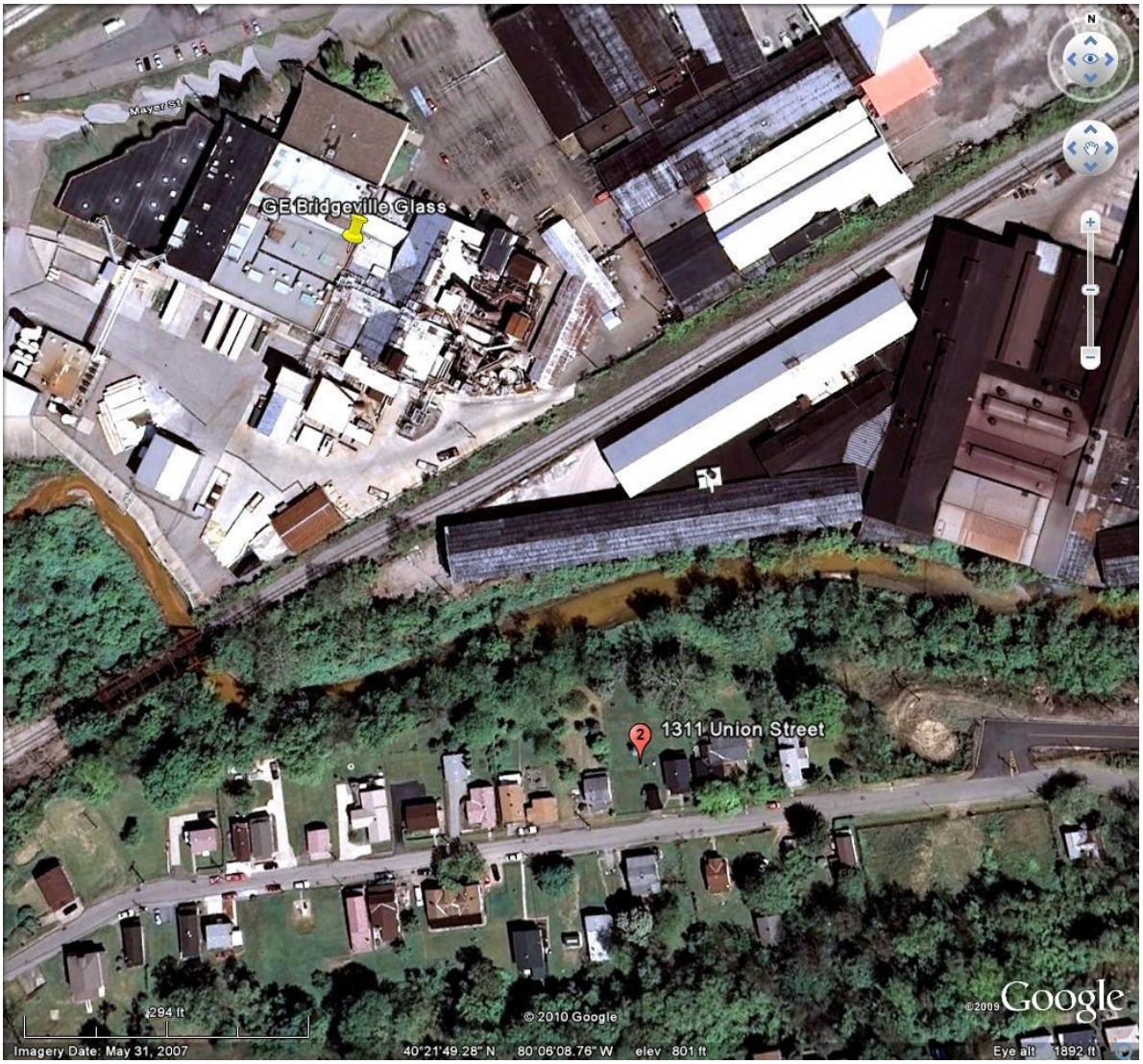
Street Name / Distance	Traffic Count (Vehicles/day)
Union St. (15m)	Unavailable
Terrace St. (100m)	Unavailable
Mayer St. (245m)	Unavailable
Washington Pike (520m)	18,000

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Industry
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South	Garage	2	5
West	House	4	10

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North	Valley	Rolling
East		Flat
South	Hill	Rolling
West		Flat

Bridgeville Location Map



West Allegheny

Address	Wilson Elementary School 100 Bruno Lane Imperial, PA		
AQS#	N/A	MSA	Pittsburgh
Municipality	Imperial	Elevation	341 m
Latitude (N)	40°26'41.09	Longitude (W)	80°16'2.29
Established	April, 2009	Probe Height	2 m
Comments	Special study monitoring location to determine the community impact of a nearby residential waste landfill. Numerous odor complaints have been received from this vicinity.		

Sensor Type	**Hydrogen Sulfide**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	Teledyne API 100 EU with H2S converter
Purpose	Population Exposure	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

West Allegheny Area Information

Street Name / Distance	Traffic Count (Vehicles/day)
Boggs Rd. (268m)	412

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Agricultural
East	Residential
South	Agricultural
West	Commercial

Direction	Obstructions	Height (m)	Distance (m)
North			
East			
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		rolling
East		rolling
South		rolling
West	valley	rolling

West Allegheny Location Map

Monroeville

Address	Evergreen Park Harper Drive Monroeville PA 15146		
AQS#	42 003 0003	MSA	Pittsburgh
Municipality	Monroeville	Elevation	350 m
Latitude (N)	40°27'0.42	Longitude (W)	79°46'15.46
Established	2010	Probe Height	3 m
Comments	Situated in a residential neighborhood. This location is impacted mainly by mobile sources.		

Sensor Type	**PM_{10}**	Appendix C Method Code	EQPM-0798-122
Network Designation	SLAMS	Method Description	Beta Attenuation Monitor
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Neighborhood
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Monroeville Area Information

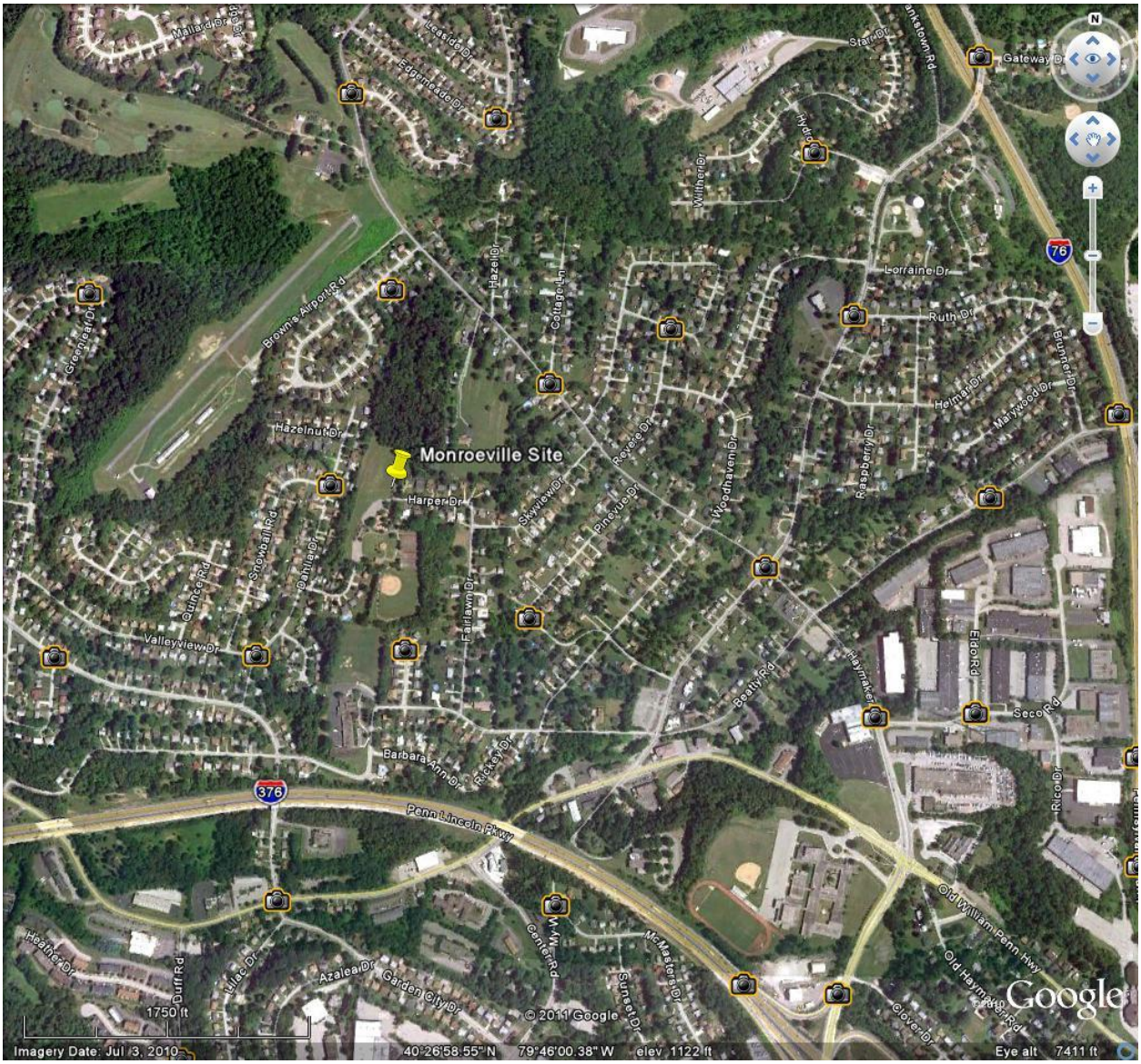
Street Name / Distance	Traffic Count (Vehicles/day)
Harper Drive (10 m)	Unavailable
Rt. 376 (590 m)	53,000
Logan's Ferry (362 m)	14,000

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East	Trees	7	13
South	Trees	8	20
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Flat
East		Flat
South		Flat
West		Flat

Monroeville Location



Parkway East Near-Road (Planned)

Address	400 Sherwood Road Wilkinsburg, PA		
AQS#	42 003 1376	MSA	Pittsburgh
Municipality	Wilkinsburg	Elevation (m)	361
Latitude (N)	40°26'14.75”	Longitude (W)	79°51'48.86”
Established	N/A	Probe Height	3 m
Comments	This site is being installed to comply with updated NO_2 NAAQS. Monitor inlets will be placed to sample air at 18 meters from the nearest traffic lane of Route 376 (Parkway East). This location was approved by EPA Region III to qualify as a near road monitoring site and will measure population exposure to roadway emissions.		

Sensor Type	**Oxides of Nitrogen (NO_2) Trace Level**	Appendix C Method Code	RFNA-0691-082
Network Designation	SLAMS	Method Description	Chemiluminescence
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Micro-Scale
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Parkway East, Cont.

Sensor Type	**Carbon Monoxide (CO) Trace Level**	Appendix C Method Code	RFCA-1093-093
Network Designation	SLAMS	Method Description	Non-dispersive Infrared
Purpose	Regulatory Compliance	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Micro-Scale
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	Automated Equivalent Method	Appendix E Siting Criteria	Yes

Sensor Type	**Black Carbon Monitor**	Appendix C Method Code	N/A
Network Designation	SPM	Method Description	Aethalometer
Purpose	Research/Scientific Monitoring	Appendix D Design Criteria	Yes
Sample Frequency	Continuous	Appendix D Scale	Micro-Scale
Appendix A QA Assessment	Yes	Appendix D Objectives	Population Exposure
Monitor Classification	N/A	Appendix E Siting Criteria	Yes

Parkway East Area Information

Street Name / Distance	Traffic Count (Vehicles/day)
Penn Lincoln Parkway Rt. 376 (15m)	84,000

Direction	Predominant Land Use (Industry, Residential, Commercial or Agriculture)
North	Residential
East	Residential
South	Residential
West	Residential

Direction	Obstructions	Height (m)	Distance (m)
North			
East	Trees, Hill	15	33
South			
West			

Direction	Topographic Features (hills, valleys, rivers, etc.)	General Terrain (flat, rolling, rough)
North		Rolling
East	Hill	Rough
South		Rolling
West		Rolling

Planned Parkway East Near-Road Site Location Map

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