2025 Five-Year Network Assessment of the Philadelphia Air Quality Surveillance System

City of Philadelphia
Department of Public Health
Air Management Services (AMS)

Date 7/1/2025

EXECUTIVE SUMMARY

Starting July 1, 2010, and every five years thereafter, 40 Code of Federal Regulations (CFR) Part 58.10(d) requires the City of Philadelphia's Department of Public Health, Air Management Services (AMS) to submit to the United States Environmental Protection Agency (EPA) an assessment of the air quality surveillance system (Assessment). This Assessment focuses primarily on Ozone and Particulate Matter less than 2.5 microns ($PM_{2.5}$) using EPA's online ambient air monitoring network assessment tool kit NetAssess v1.1 (https://rconnect-public.epa.gov/NetAssess2025/). This assessment tool also has the ability to analyze the other criteria pollutants: Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Lead (Pb), and Particulate Matter of less than 10 microns (PM_{10}).

This Assessment supplements the annual Air Monitoring Network Plan (AMNP, or Plan) and is being submitted alongside it on July 1, 2025. The Assessment and Plan provide a comprehensive review of the Philadelphia air monitoring network and the relative value of each monitor and station. In general, the Assessment determined that the AMS network meets the monitoring objectives. The results of this Assessment are as follows:

- $PM_{2.5}$: The commitment to EPA requires five $PM_{2.5}$ monitoring sites within the city of Philadelphia. AMS currently operates six regulatory continuous/Federal Equivalent Method (FEM) $PM_{2.5}$ monitors (LAB, NEW, RIT, FAB, TOR, MON) and has installed a seventh continuous monitor (HUN) that will begin measurements by the end of 2025. AMS also operates a Federal Reference Method (FRM) monitor at NEW. AMS also operates one non-regulatory monitor (VGR).

- Ozone: AMS currently operates three regulatory ozone monitors (LAB, NEA, NEW), exceeding regulatory requirements of at least one ozone monitor. AMS also operates one non-regulatory monitor (VGR).

- AMS operates one National Core multipollutant (NCore) monitoring station (NEW) in accordance with EPA requirements.

- AMS operates one Photochemical Assessment Monitoring Station (PAMS) monitor (NEW) for precursors of ozone in accordance with EPA requirements.

- Other Criteria Pollutants: The trends for CO, SO_2, NO_2, Pb, and PM_{10} show large declines over the past 25 years and are well below the corresponding National Ambient Air Quality Standard (NAAQS). AMS operates two near-road NO_2 monitors (MON, TOR) and an NCore site (NEW).

- Monitoring Equipment: In 2020, AMS identified the need to replace and modernize much of its equipment. While much equipment has been replaced since 2020, AMS must continue to replace and upgrade equipment as necessary in the next five years. The availability of funding from federal sources will impact AMS' ability to keep its equipment up to date.

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INTRODUCTION / REGULATORY REQUIREMENT

Philadelphia currently operates nine (9) EPA regulatory air monitoring stations and one (1) non-regulatory monitoring station as shown in Figure 1 below. The non-regulatory air monitoring station is the Village Green (VGR) monitor. An additional regulatory monitoring station (HUN) is scheduled for start-up by the end of 2025. The regulatory air monitoring stations house instruments that measure ambient levels of gaseous, solid and liquid aerosol pollutants. The network of regulatory and non-regulatory monitors is operated by the City of Philadelphia, Department of Public Health, AMS, the local air pollution control agency for the City of Philadelphia. This network is part of a broader network of air monitoring agencies in Pennsylvania, New Jersey, Delaware and Maryland that make up the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Core-Based Statistical Area (CBSA).

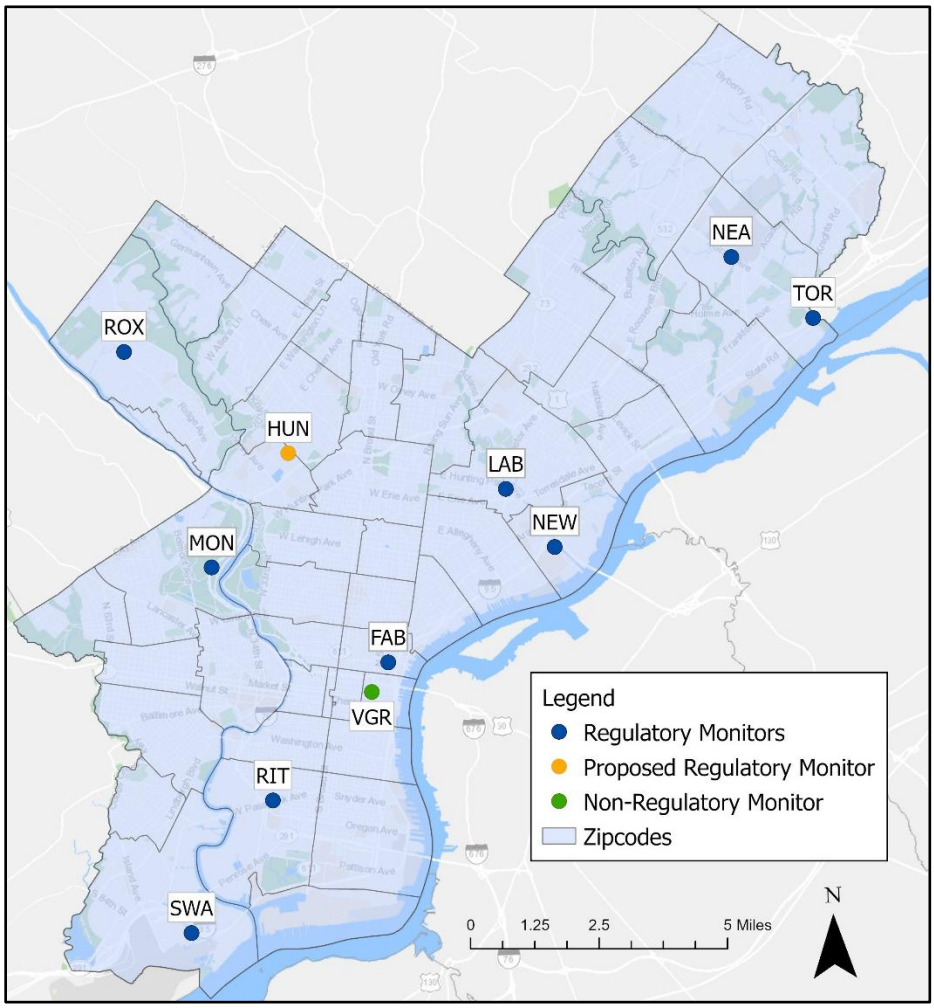


Figure 1: Map of regulatory and non-regulatory air monitoring stations in Philadelphia

Table 1 shows which pollutants are measured at each of the regulatory monitors in Philadelphia, the Village Green monitor, and the new HUN monitor.

Table 1: Summary of Pollutants Measured at each Monitor

			Parameter														
AQS Site Code	AMS Site	Address	CO	SO_2	Ozone	NO_2	NOy/NO	PM_{10}	$PM_{2.5}$	Speciated $PM_{2.5}$	PM Coarse	Carbonyls	PAMS VOC	TSP Metals (Be, Cr, Mn, Ni, As, Cd, Pb)	Toxics TO15	MET	AMS Site
421010004	LAB	1501 E. Lycoming St			X				X								LAB
421010014	ROX	Eva & Dearnley Sts										X			X		ROX
421010024	NEA	Grant Ave & Ashton Rd			X												NEA
421010048	NEW	2861 Lewis St	X	X	X	X	X	X	X	X	X	X	X		X	X	NEW
421010055	RIT	24th & Ritner Sts		X					X	X		X		X	X		RIT
421010057	FAB	3rd & Spring Garden Sts							X								FAB
421010063	SWA	8200 Enterprise Ave										X			X		SWA
421010075	TOR	4901 Grant Ave & James St	X			X			X							X	TOR
421010076	MON	I-76 & Montgomery Drive	X			X			X					X			MON
(not in AQS)	VGR	6th & Arch Sts			X				X							X	VGR
421010068	HUN	5200 Wissahickon Ave *				X			X			X			X		HUN

*HUN is a new site proposed for 2025

The EPA created regulations on how the air monitoring network is to be set up. These regulations can be found in Title 40 - Protection of Environment in the Code of Federal Regulations (CFR) Part 58 – Ambient Air Quality Surveillance, located online at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-58

Beginning July 1, 2007, and each year thereafter, AMS has submitted to EPA Region III, an Air Monitoring Network Plan (AMNP or Plan) which assures that the network stations continue to meet the criteria established by federal regulations.

Per 40 CFR Part 58.10(d), AMS is required to submit to EPA Region III 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 the CFR: whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into 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. AMS must submit a copy of this Assessment, along with a revised AMNP, to EPA Region III. The first Assessment was submitted July 1, 2010. The second Assessment was submitted July 1, 2015. The third Assessment was submitted on July 1, 2020.

This Assessment, in combination with the AMNP, provides a comprehensive review of the Philadelphia air monitoring network and the relative value of each monitor and station with consideration of data users such as nearby states or health effect studies, using tools provided by EPA. It covers the NAAQS, Air Toxics, and meteorological monitoring networks and associated technology for which AMS has responsibility, with an emphasis on those NAAQS associated with high human health risk. This Assessment helps to

optimize the network to achieve, with limited resources, the best possible scientific value and protection of public and environmental health and welfare. The Assessment helps focus on pollutants that are new or persistent challenges, address multiple, interrelated air quality issues, and de-emphasize pollutants that are steadily becoming less problematic and better understood.

POPULATION SUMMARY

The purpose of air pollution control and air quality assessments are to protect the health of the public and the environment. Population data and trends help evaluate where the monitoring network should be located and which areas have vulnerable populations. Population trends also help determine what areas may need new focus and what areas may not need as much focus. For this assessment, data from the 2020 U.S. Census, the most recent census, were used.

Based on 2020 census data, Philadelphia ranked as the 6th largest city in United States with a population of 1,603,797 people. Figure 2 shows the population density by census tracts in 2020. In 2020. Population density was highest in Center City, West Philadelphia, and in parts of North Philadelphia. Center City, where there are many apartment buildings, has population densities of up to 8,600 people per square mile. Areas to the far northeast, far northwest, far south, and along the Delaware River are less densely populated. The northeast and northwest parts of the city have less dense housing, with more single-family homes and yards. The areas to the far south and along the Delaware River to the east are more industrial and have very few homes.

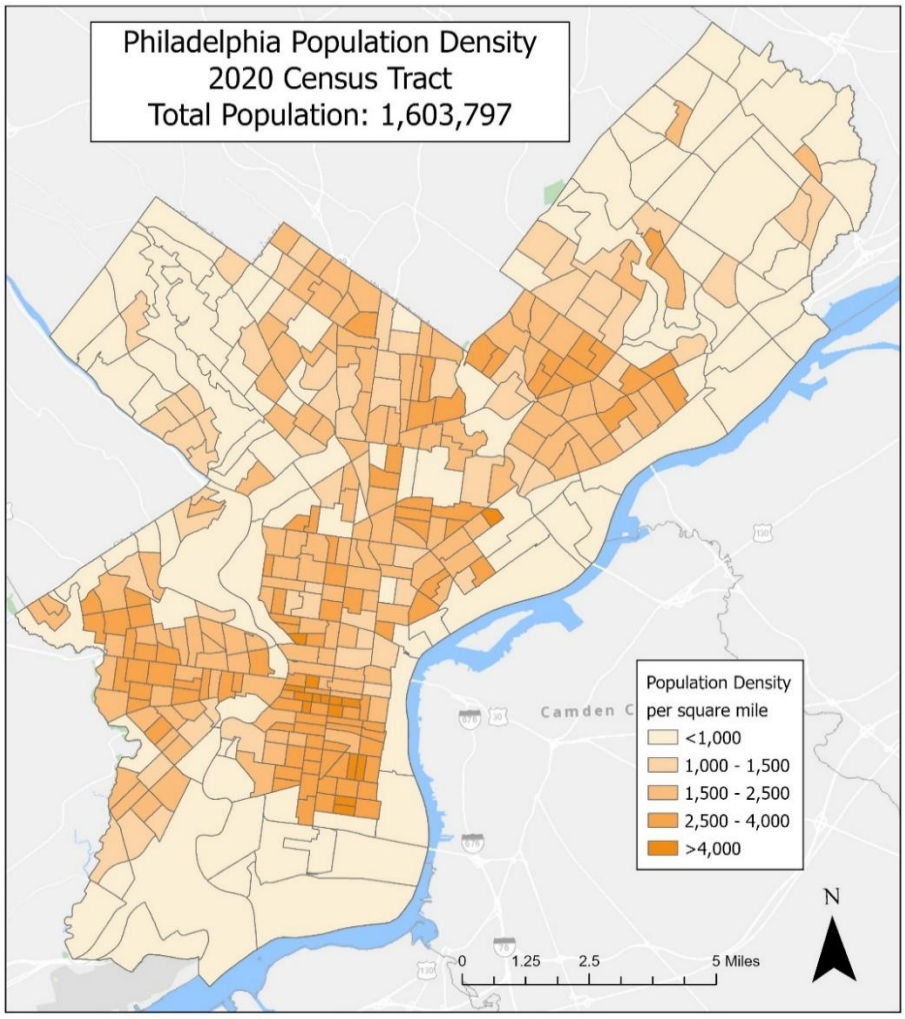


Figure 2: Philadelphia population density in 2020 by census tract

Figure 3 shows the relative population change between 2010 and 2020 for each census tract. Philadelphia averaged a population growth rate of 0.5% per year from 2010 - 2020. The population change shows which areas of the city have growing populations and which have shrinking populations. Population trends show that most census tracts in Philadelphia experienced population growth or decline that was less than 25%. Consistent population growth occurred in Northeast Philadelphia, Center City, and South Philadelphia. The area with the most population decline was North Philadelphia. Center City census tracts had some of the highest population growth rates, with several tracts increasing more than 50% in 10 years. The areas outside of center city with the highest population growth or decline are mostly industrial areas or parks where few people live. Therefore, any changes in the population will appear large relative to the size of the overall population in that census tract. While 2020 is the most recent Census available, population estimates in 2023 show that the Philadelphia population has shrunk by 3.3%. This is likely due to the Covid-19 pandemic that affected population movements during and after 2020.

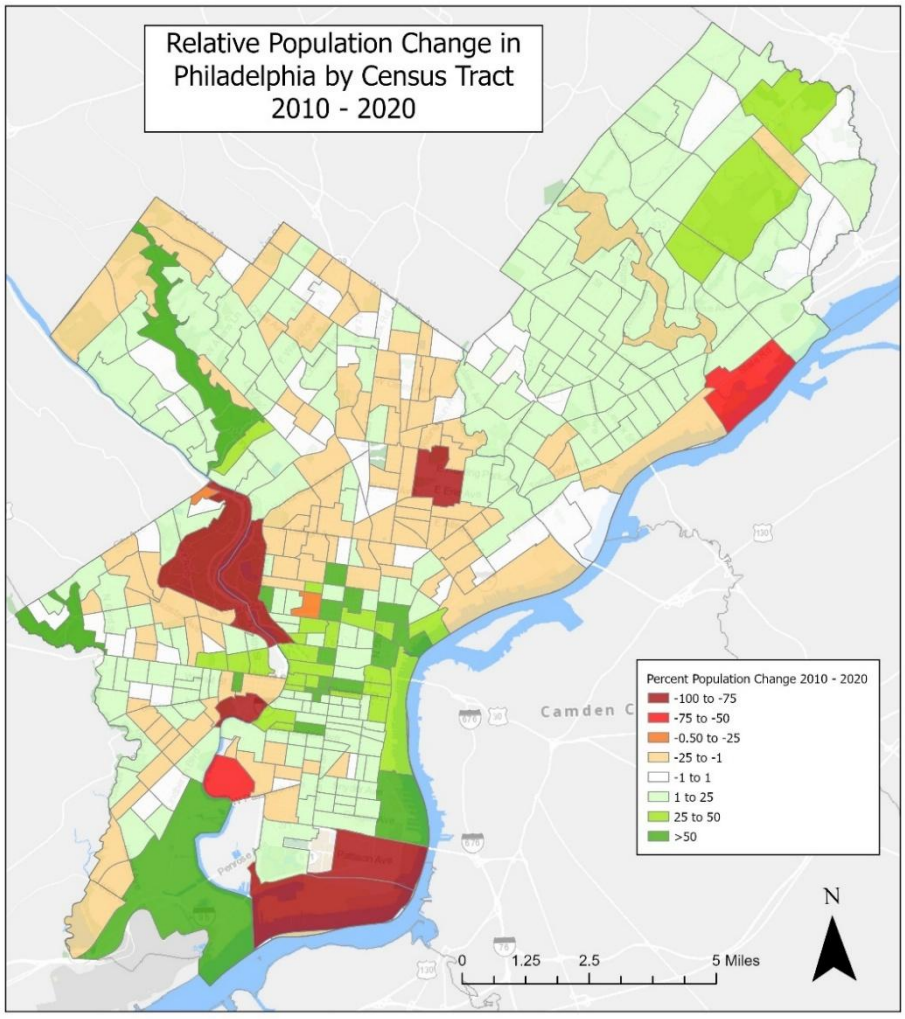


Figure 3: Relative population change from 2010 – 2020 by Philadelphia census tract

Philadelphia has been an industrial city for centuries and has many areas where historically disadvantaged and underserved communities are disproportionately affected by air pollution. Coverage for sensitive populations by air monitors is discussed for each pollutant using the Area Served tool.

METEOROLOGICAL SUMMARY

Wind patterns and meteorological conditions determine where pollution from industrial and other sources travels and impacts the public. Understanding atmospheric behavior helps assess whether monitors are accurately capturing the pollution levels in the area. Philadelphia has two airports which record meteorological conditions including wind direction, wind speed, temperature, humidity, solar radiation, and other parameters. Neither meteorological station in Philadelphia records upper air data. The meteorological data helps estimate where pollution travels and how atmospheric conditions affect photochemical reactions. Figure 4 shows the annual wind roses at Philadelphia

International Airport (PHL) (bottom left) and Northeast Philadelphia Airport (PNE) (top right) from 2020 – 2024. The centers of the wind roses are located at the weather station. The wind roses were created using the cli-MATE Tool which is provided by the National Oceanic and Atmospheric Agency (NOAA) and the Midwestern Regional Climate Center (MRCC).

Note: On wind roses, the wide part of the cone shows which direction the wind comes from. The closer to the edge of the circle the cone extends, the more often wind comes from that direction. The amount of a cone a certain wind speed occupies relates to how often the wind from that direction is that particular speed.

Figure 4 shows that wind in Philadelphia predominantly blows from Southwest, West, and Northwest. Wind at PHL predominantly blows from the Southwest, while wind at PNE predominantly blows from the Northwest.

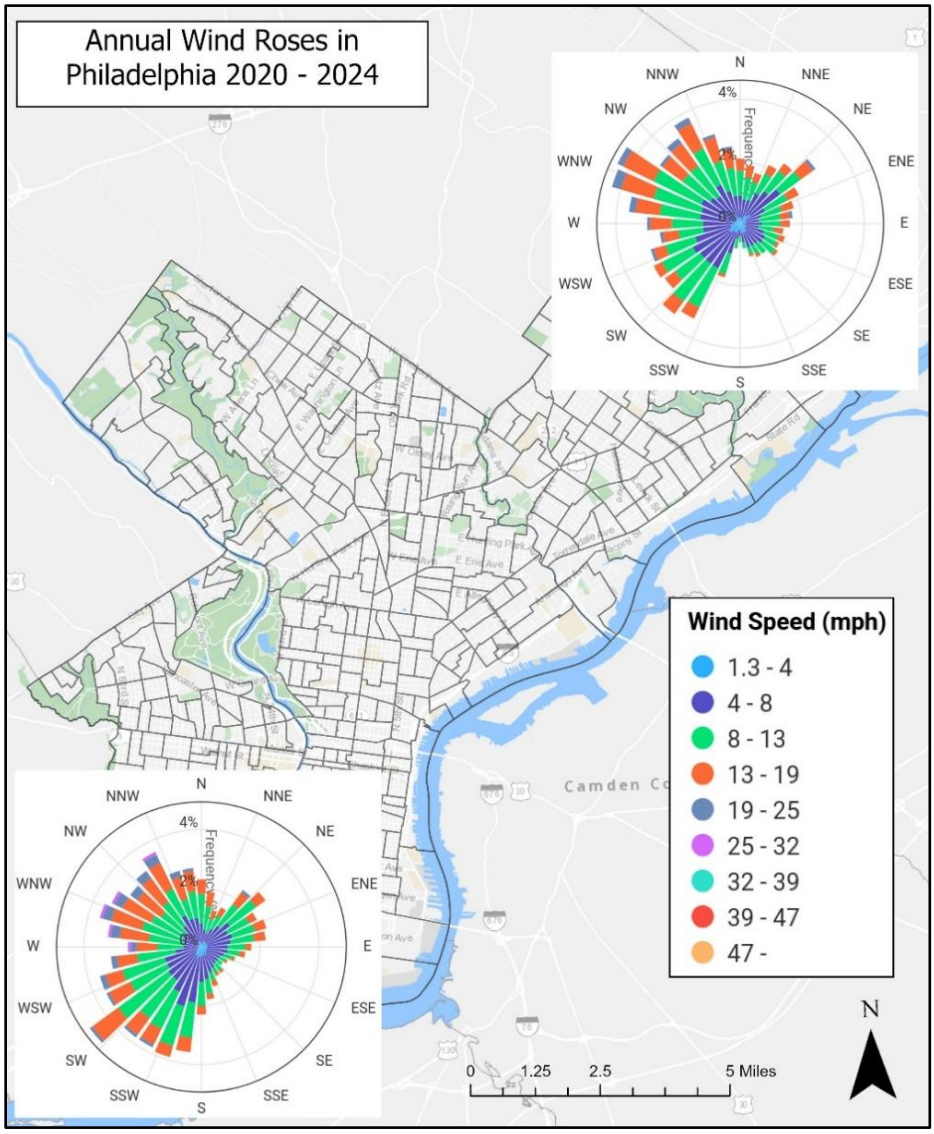


Figure 4: Philadelphia wind roses at PHL and PNE from 2020 – 2024

While annual wind roses are useful to understand general wind patterns, pollution and meteorology vary by season. Figures 5 – 8 show seasonal wind roses at PHL and KNE.

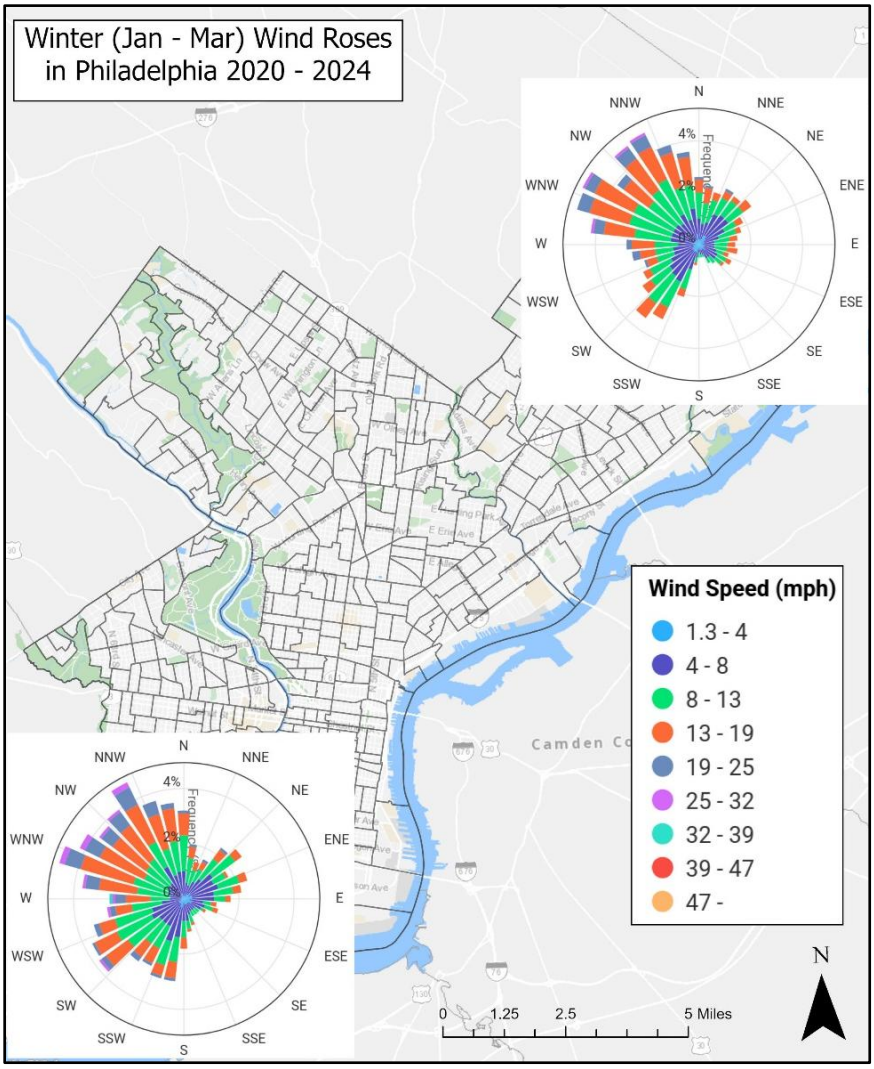


Figure 5: Winter (Jan – Mar) wind rose at PHL and PNE 2020 – 2024

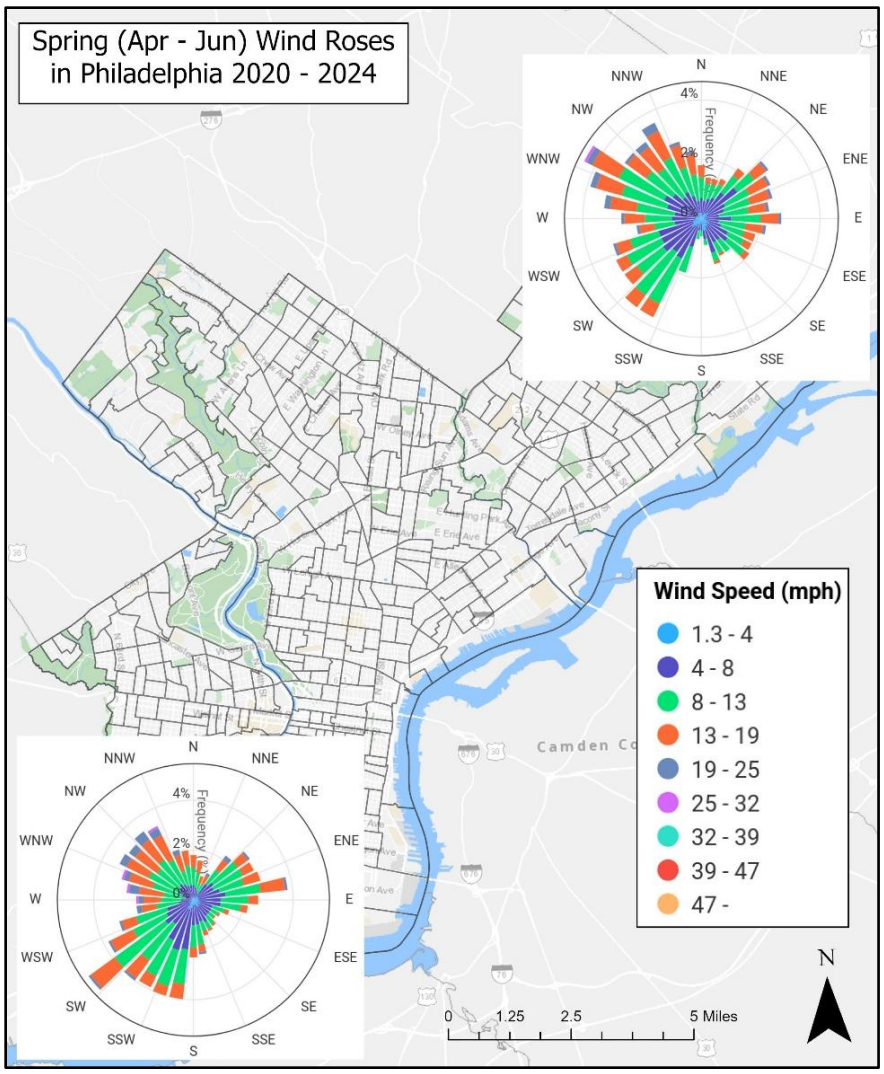


Figure 6: Spring (Apr – Jun) wind rose at PHL and PNE 2020 – 2024

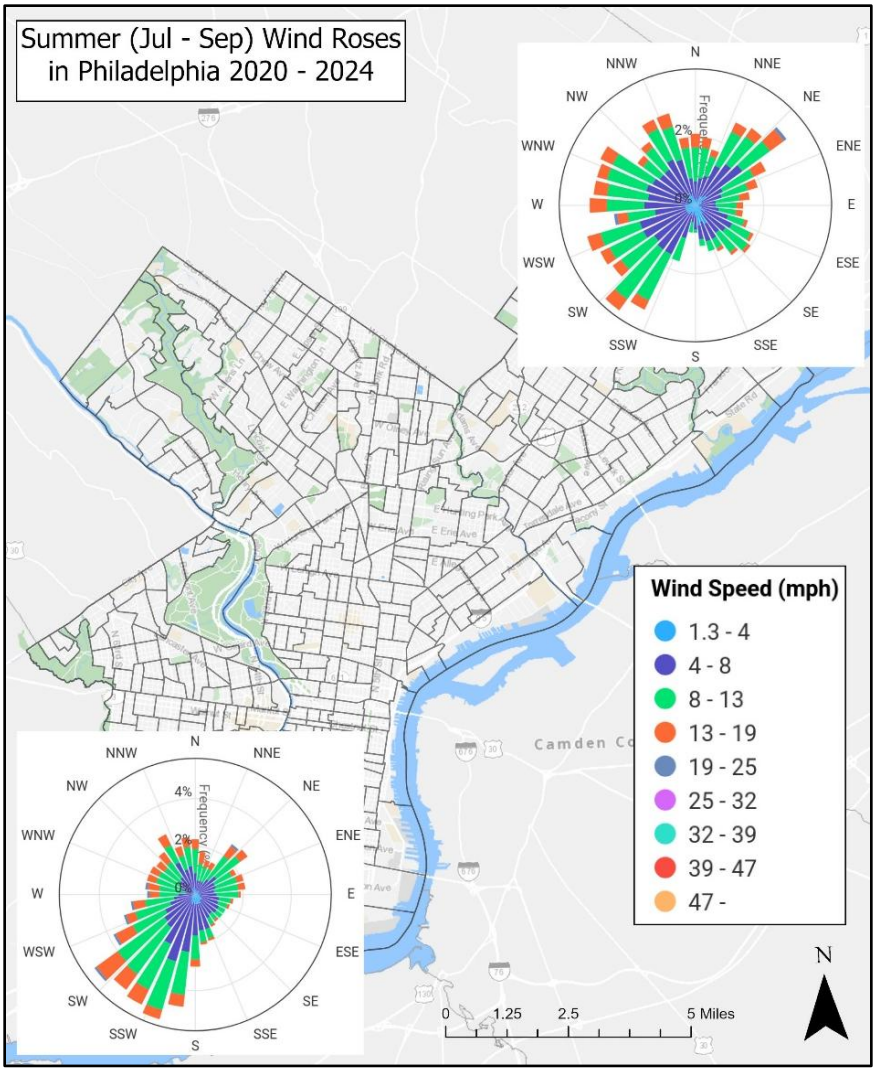


Figure 7: Summer (Jul – Sep) wind rose at PHL and PNE 2020 – 2024

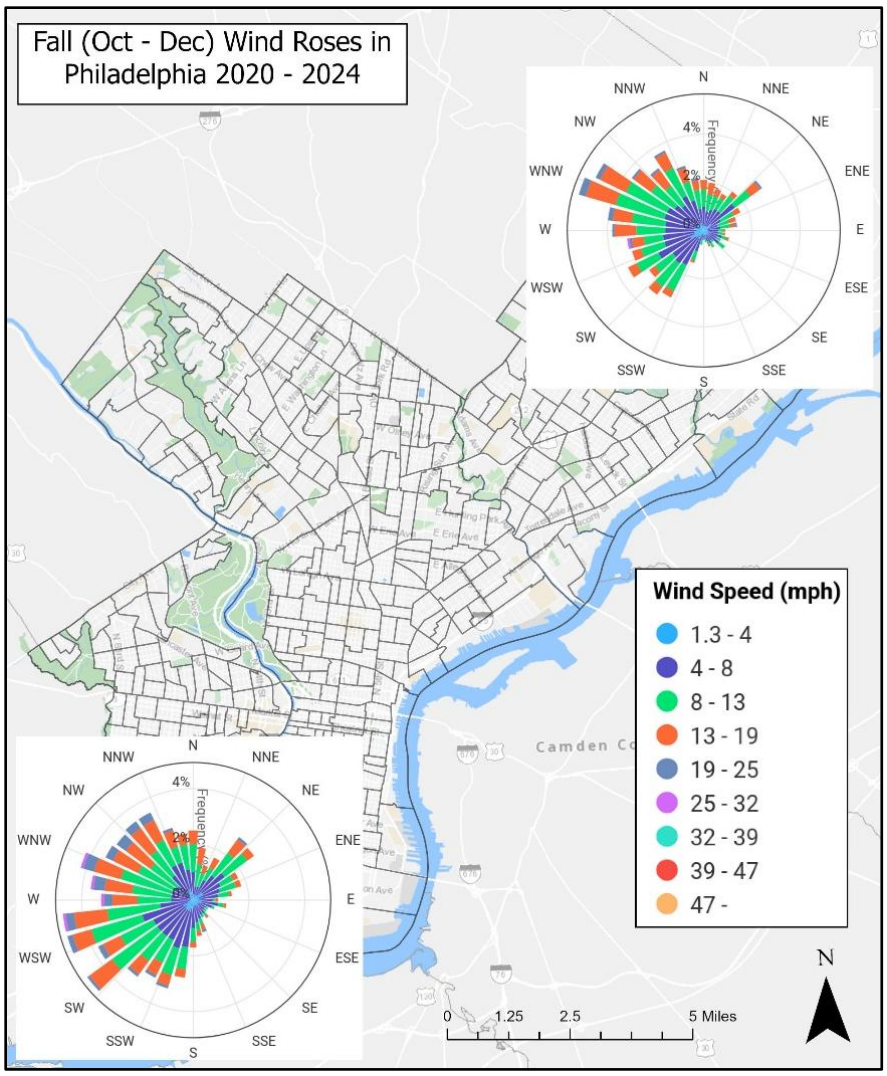


Figure 8: Fall (Oct – Dec) wind rose at PHL and PNE 2020 – 2024

Based on the seasonal wind roses, some seasonal wind trends become clear. From Jan - Mar, wind predominantly blows from the NW from the more mountainous and cold parts of the region. Spring shows a mix of NW wind and SW wind. In the summer, wind blows predominantly from the SW and SSW. In the fall, wind blows from the West and NW. but also from the SW at PHL.

During ozone season (spring and summer), the winds predominantly blow from the SW, but also from the NW at PNE. The predominant SW wind during ozone season means that SW is the upwind direction and NE is the downwind direction. This distinction is important for determining which monitors are considered “downwind” or “upwind” monitors for ozone measurements.

EMISSIONS SUMMARY

Monitoring networks are designed for two main purposes: to understand population exposure to air pollution and to assess the impact of air pollution near major sources or in areas with multiple sources. Monitoring pollution near sources requires up-to-date knowledge of existing facilities, as well as those that have shut down, relocated, or been newly proposed or constructed. Additionally, analyzing general trends in facility development and closures is essential to anticipate future conditions.

Philadelphia has many different air pollution sources of varying sizes throughout the city. AMS issues permits for Major Facilities (Title V), Synthetic Minor Facilities (those with the potential to be Major Facilities but that have accepted voluntary permit limits to remain below Major Facility thresholds), and Minor Facilities. The emissions inventory in Philadelphia includes major and synthetic minor facilities. Emission changes from 2018 to 2023, the most recent emission inventory, were assessed. Between 2018 and 2023, nine major or synthetic minor facilities were shut down and subsequently removed from the inventory. Notably, this includes the Philadelphia Energy Solutions (PES) refinery, the largest Title V source in the city, which ended most operations following a 2019 explosion. While PES retained its Title V status until 2024, most emission sources were removed prior to 2023. The shutdown of PES resulted in significant reductions in $PM_{2.5}$, NO_x, and Volatile Organic Compound (VOC) emissions. Emission changes related to PES are discussed and illustrated in the following figures. During the same period, three major or synthetic minor sources began operation in Philadelphia. Figure 9 shows the status of major and synthetic minor facilities in Philadelphia from 2018 to 2023, highlighting which facilities have ceased operations, changed status, or opened as synthetic minor facilities.

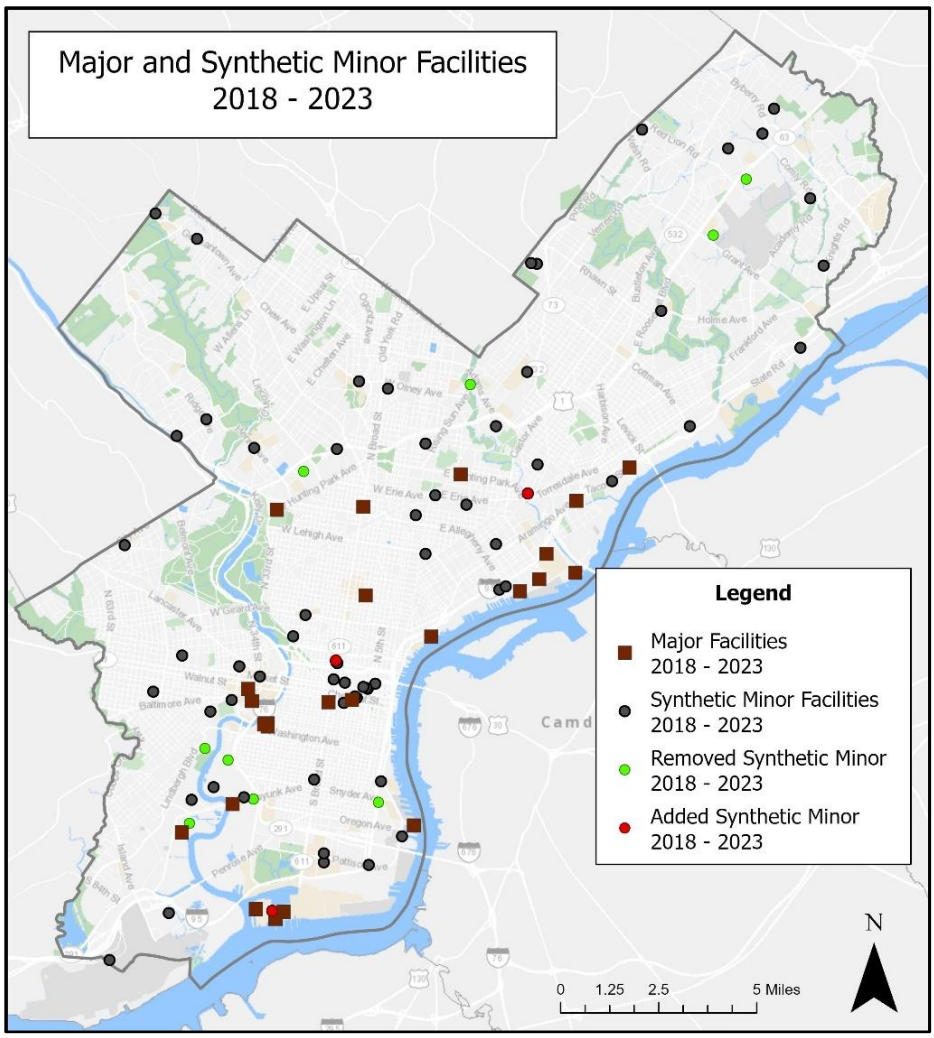


Figure 9: Major and Synthetic Minor Facilities from 2018 - 2023

In Philadelphia, $PM_{2.5}$ and ozone are the main criteria pollutants of concern due to the area's nonattainment status for ozone and recent changes to the $PM_{2.5}$ NAAQS. While direct emissions of $PM_{2.5}$ are a major contributor to ambient $PM_{2.5}$ concentrations, ozone precursors are a more important indicator for ambient ozone concentrations. Therefore, emission trends for $PM_{2.5}$ emissions and ozone precursor emissions (Nitrogen Oxides [NO_x] and VOC) were analyzed from 2018 – 2023. Comparisons were done from 2018 – 2023 because that was the most recent period of emission inventories. Figures 10 – 12 show where emission are decreasing and where they are increasing. Emissions are based on a year of operation and are in units of tons per year (tpy). Figures 13 – 15 show density of emissions in Philadelphia in 2018 and 2023.

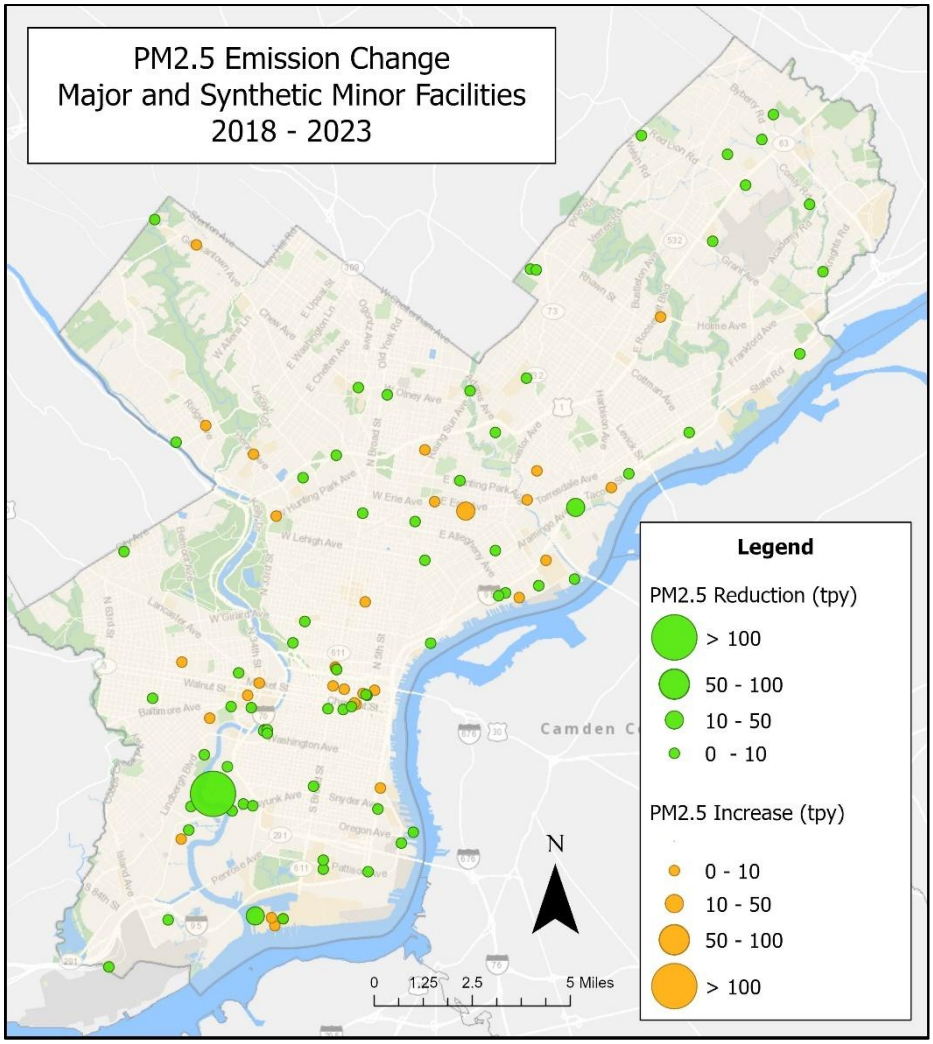


Figure 10: $PM_{2.5}$ emission changes from 2018 – 2023

Figure 10 shows several decreases and increases in $PM_{2.5}$ emissions throughout the city. The figure clearly shows how the end of operations at PES refinery (the only reduction greater than 100 tpy) had a large impact on $PM_{2.5}$ emissions in Philadelphia. The shutdown of PES in 2019 resulted in the removal of 168 tpy of $PM_{2.5}$ emissions from the emissions inventory, based on the facility's 2018 reported emissions. That year, PES accounted for approximately 58% of the total $PM_{2.5}$ emissions in Philadelphia's inventory. From 2018 to 2023, PES was responsible for 81% of the total $PM_{2.5}$ emission reductions citywide. Aside from PES, Philadelphia experienced many smaller changes in $PM_{2.5}$ emissions. The total decrease in $PM_{2.5}$ emissions from 2018 – 2023 in the Philadelphia emission inventory was 206 tpy. The largest increase during this period was approximately 10 tpy, occurring in the east North Philadelphia area.

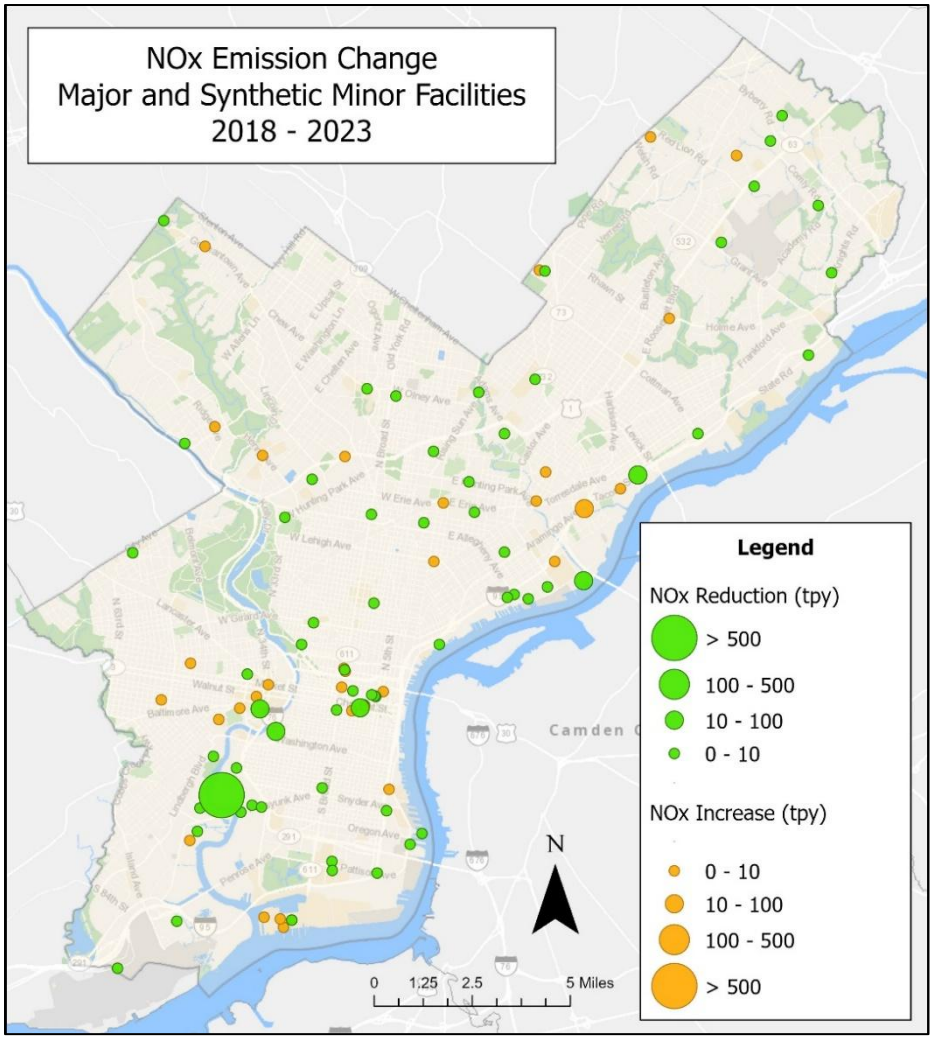


Figure 11: NO_x emission changes from 2018 - 2023

Figure 11 shows how PES represented the largest reduction in NO_x emissions in the city, totaling a 1,185 tpy reduction from 2018 – 2023. Besides PES, there were mostly smaller changes in NO_x emissions. In 2018, PES accounted for 52% of all NO_x emission in the inventory. From 2018 – 2023, the shutdown of PES resulted in almost 86% of the total reduction in NO_x emissions in the emission inventory. The total NO_x emissions decrease in the Philadelphia emission inventory from 2018 – 2023 was 1,380 tpy. The largest addition of NO_x emissions was 19 tpy at the Advansix chemical plant, a Title V facility.

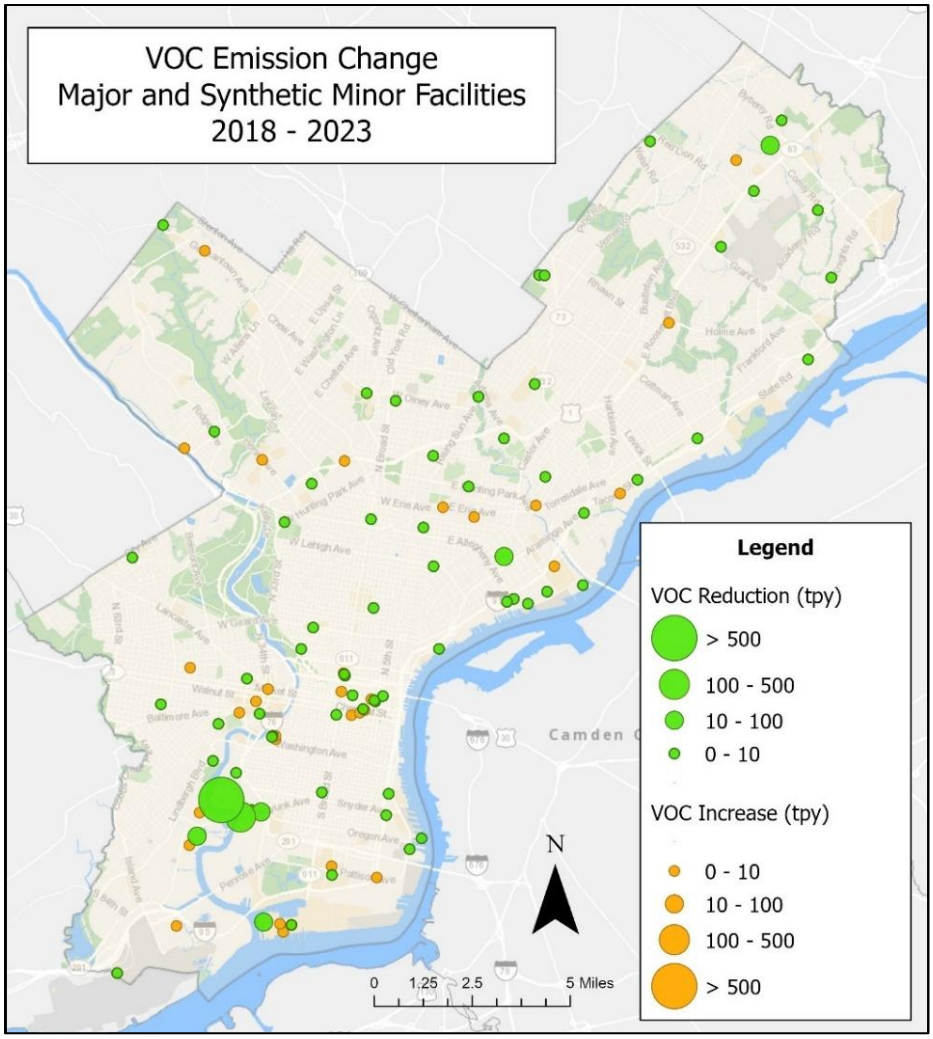


Figure 12: VOC emission changes from 2018 - 2023

Figure 12 shows how PES represented most of the reduction in VOC emissions from 2018 – 2023. PES operated 3 facilities that contributed to the total VOC emissions of the refinery. When the refinery shut down, the total emissions decreased by 786 tpy. In 2018, PES accounted for 62% of VOC emissions in the emission inventory. From 2018 – 2023, PES accounts for 88% of the total VOC emissions reduction in the emission inventory. The total VOC emissions decrease in the Philadelphia emission inventory from 2018 – 2023 was 892 tpy. The largest increase in VOC emissions was 6.6 tpy at a generating station in the Grays Ferry neighborhood about 1.5 miles north of PES. The emission change figures show several areas with large reductions in $PM_{2.5}$, NO_x and VOC emissions.

These trends may support the relocation of monitors away from areas where emissions have significantly declined. However, emission reductions alone do not reveal where elevated emissions persist. Figures 13 – 15 highlight the areas in Philadelphia with the highest emissions of $PM_{2.5}$, NO_x, and VOCs in 2018 and 2023. These figures illustrate changes over time while also identifying areas where emissions remain highest. It is important to note that the figures do not include vehicle and highway emissions, which are

among the largest contributors in Philadelphia. Additionally, the figures are not directly comparable across years and should be interpreted as a qualitative assessment of cumulative emissions in industrial areas.

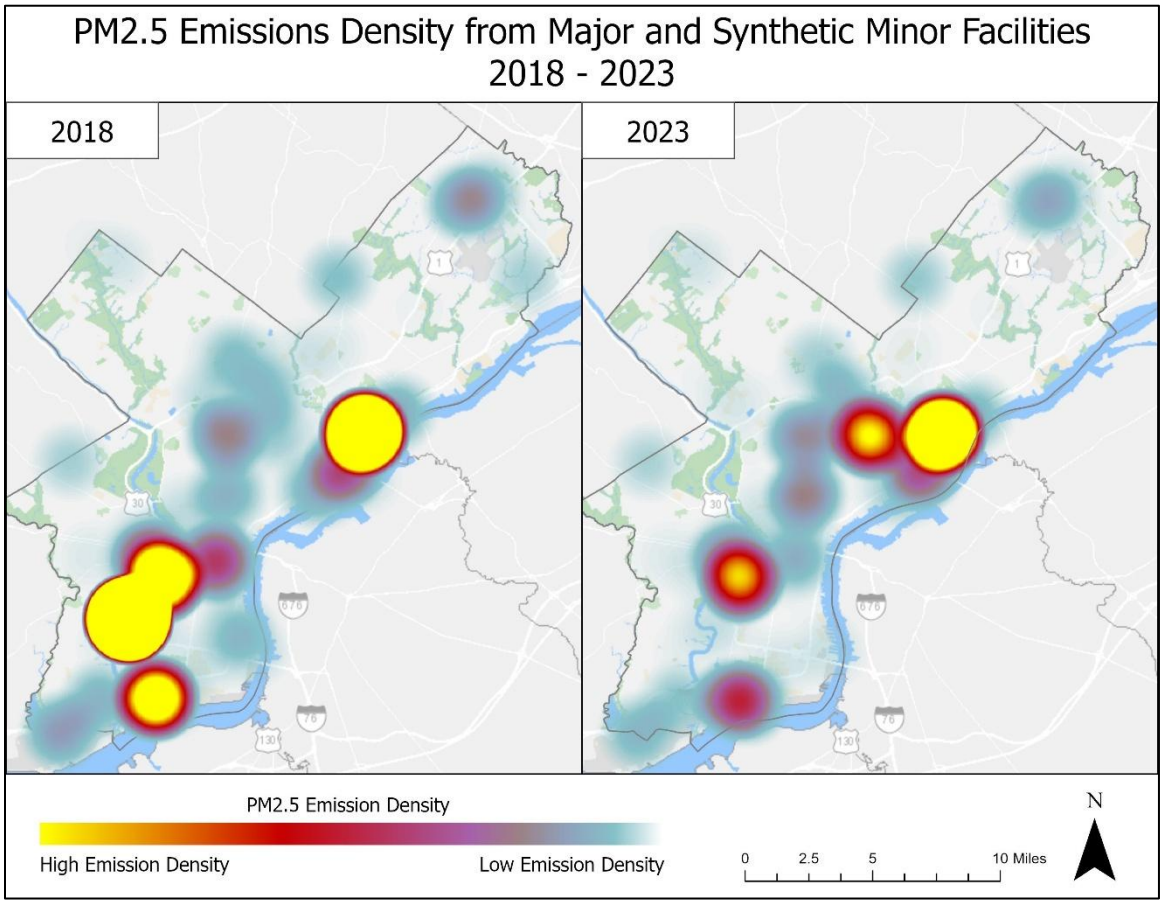


Figure 13: $PM_{2.5}$ Emissions density in 2018 and 2023

Figure 13 clearly shows a reduction in $PM_{2.5}$ emissions associated with the shutdown of PES. Although emissions near the former PES site have significantly decreased, the area remains one of the city's $PM_{2.5}$ hotspots. The RIT monitor, originally installed to assess the refinery's impact on the surrounding community, continues to provide valuable data, as other major $PM_{2.5}$ sources remain in the area, including a nearby interstate highway. The largest increase in $PM_{2.5}$ emissions occurred near the LAB monitor. Since there is a monitor already in place to evaluate this area, installation of an additional monitor is not currently necessary.

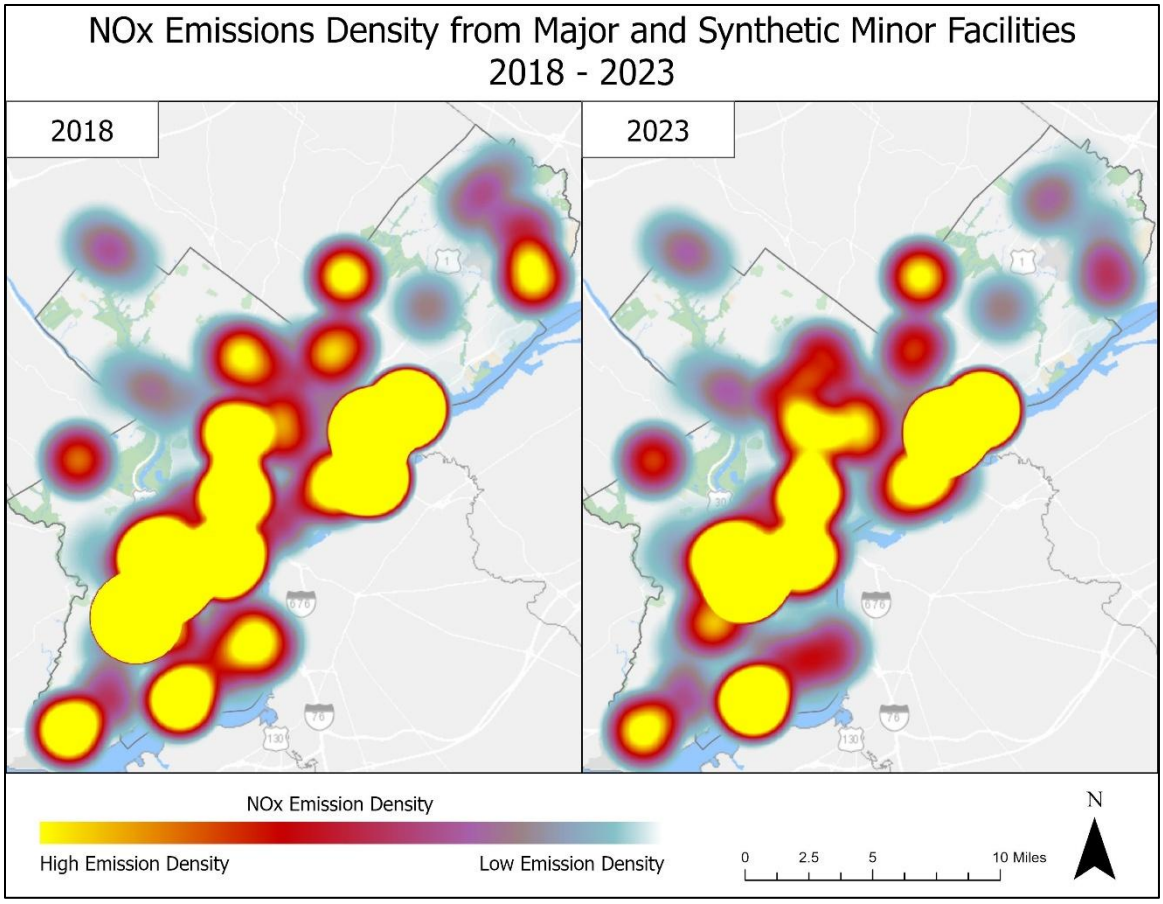


Figure 14: NO_x Emission density in 2018 and 2023

Figure 14 shows that NO_x emissions remain distributed across several areas of Philadelphia. While the removal of PES is evident in the comparison between 2018 and 2023, several notable NO_x sources are still present near the former refinery site. Areas such as the former PES location, Center City, North Philadelphia, the industrial corridor to the northeast, and the Navy Yard to the south contribute significantly to overall NO_x emissions. Meanwhile, reductions in NO_x emission density are observed in parts of the southeast near the Port of Philadelphia and in the far northeast.

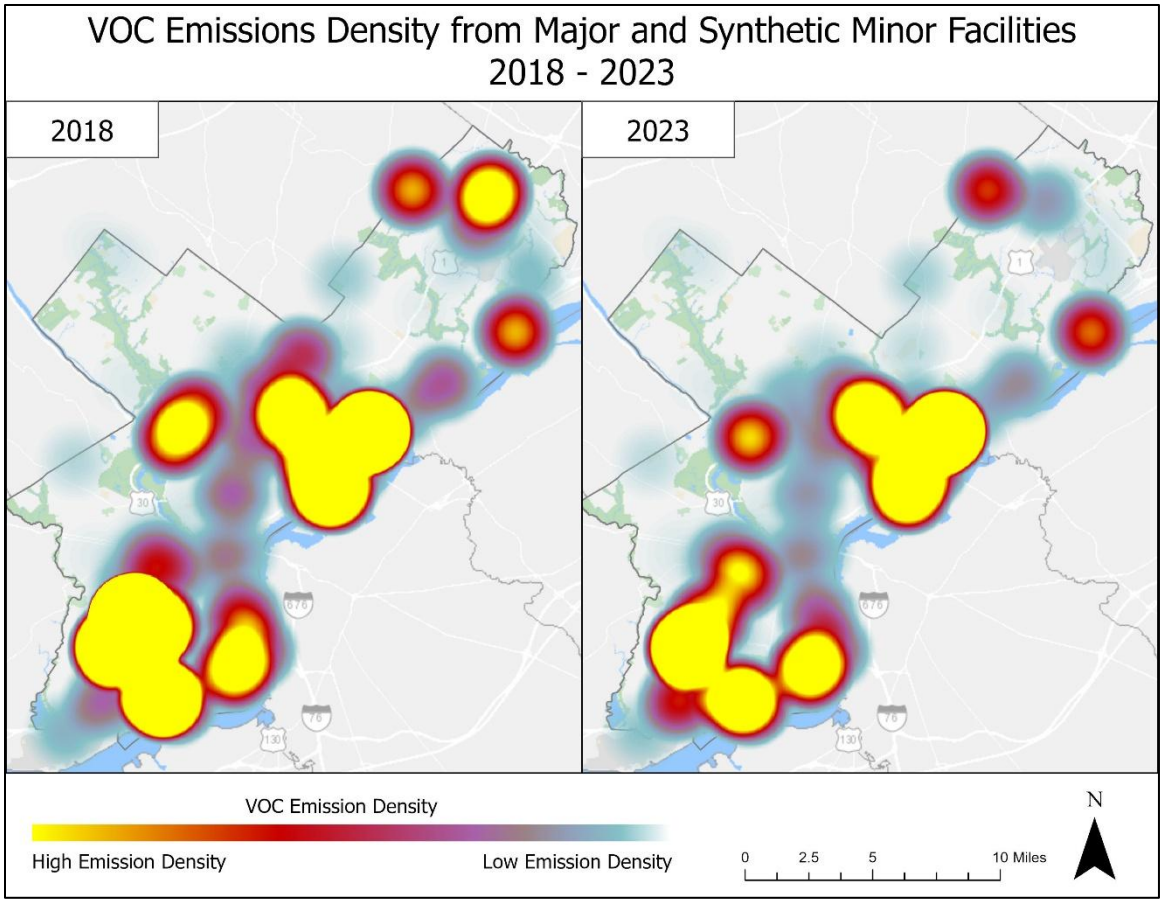


Figure 15: VOC emission density in 2018 and 2023

Figure 15 illustrates a notable reduction in VOC emissions from PES. Although PES is no longer operational, other facilities in the area continue to contribute to VOC emissions. As a result, monitors in this area should remain in place. The Navy Yard and Port of Philadelphia areas to the south and southeast continue to show significant VOC emissions. Currently, there are no VOC monitors in this area, so it could be considered for the addition of a VOC and Carbonyl monitor. The area in the northeastern part of the city exhibits the highest VOC emission density in 2023 and is covered by the NEW monitor, suggesting that additional monitors may not be necessary at this time.

In Philadelphia, the past decade has seen significant reductions in criteria pollutant emissions, as illustrated by the figures. Currently, there are no pending plan approvals expected to cause significant changes to overall air quality or to emissions at specific locations

NETWORK ASSESSMENT TOOLS

EPA released a Web-based assessment tool kit in 2020 called, NetAssess2020 v1.1. EPA created an updated version of this tool for 2025, NetAssess2025 v1.1 (Tools), available to all state and local agencies at https://rconnect-public.epa.gov/NetAssess2025/. This network assessment uses the EPA Tools.

The EPA Tools gather monitoring data from recent years up to 2023, including $PM_{2.5}$ annual 98th percentile, $PM_{2.5}$ annual design value, $PM_{2.5}$ 24-hour design value, ozone annual 4th highest 8-hour value, ozone annual design value, etc., as well as data of other criteria pollutants. Active site and monitor records were taken from EPA's Air Quality System (AQS).

The Tools help the network assessment answer two main questions:

- Which sites are redundant and could possibly be either removed or relocated?
- Where is more information needed to better characterize air quality and could, therefore, use a new site?

The Tools are used as a weight of evidence in deciding whether or not to keep a monitoring site or possibly establish a new site. These Tools include the area served tool, the correlation matrix tool, the exceedance probabilities tool, and the removal bias tool.

The Area Served tool uses a spatial analysis technique known as Voronoi or Thiessen polygons to show the area represented/served by a monitoring site. The shape and size of each polygon is dependent on the proximity of the nearest neighbors to a particular site. All points within a polygon are closer to the monitor in that polygon than to any other monitor. Once the polygons are calculated, data from the 2020 decennial census are used to find the census tract centroids within each polygon. The population represented by the polygon is calculated by summing the populations of these census tracts.

The Correlation Matrix tool calculates and displays the data correlation, value difference, and distance between each pair of sites. The purpose of this tool is to provide a means of determining possible redundant sites that could be removed. Possible redundant sites would exhibit fairly high correlations consistently across all of their data pairings and would have low average value difference in their data. Usually, it is expected that correlation between two sites will decrease as distance increases. However, for a regional air pollutant such as ozone, sites in the same air shed can have very similar concentrations and be highly correlated. More unique sites would exhibit the opposite characteristics. They would not be very well correlated with other sites and their value difference would be higher than other site-to-site pairs.

On the diagonal line in the correlation matrix from upper-left to lower-right, the 2023 design value of each site is shown. In the upper-right triangle of the matrix, the number indicates the distance (km) between two sites, and the shade of red color indicates the mean absolute value difference (see Figure 17 as an example). In the lower-left triangle of the matrix, the value is the number of observation data pairs used in correlation while the shade of blue color indicates Pearson correlation (1 being the highest). The correlation between two sites quantitatively describes the degree of relatedness between the measurements made at two sites. That relatedness could be caused by various influences including a common source affecting both sites to pollutant transport caused by meteorology. The correlation may indicate whether a pair of sites is related, however it does not indicate if one site consistently measures pollutant concentrations at levels substantially higher or

lower than the other (i.e. value differences). For this purpose, the red color shades in the upper-right triangle should be examined. Besides the color shades, the precise values of correlation and measurement difference can be downloaded from the Tools.

The correlation matrix tool uses daily summary pollutant concentration data for ozone and $PM_{2.5}$. For ozone, the correlation matrix tool calculates a Pearson correlation (R) for all valid 8-hour average ozone (AQS code 44201) concentration pairs. Individual monitoring sites are identified using the AQS Site ID, which is a combination of the state code, county code, and site ID fields (XX-XXX-XXXX). If a site has more than one monitor collecting ozone data, the daily maximum 8-hour ozone concentration is the average of all valid results for that site on that date. For $PM_{2.5}$, the correlation matrix tool calculates Pearson Correlations (R) for all valid 24-hour fine particle concentration pairs stored under AQS parameter codes 88101 ($PM_{2.5}$ Local Conditions - FRM/FEM/ARM). If a site has more than one monitor collecting $PM_{2.5}$ data, the daily average $PM_{2.5}$ concentration is the average of all valid results for that site on that date.

The Exceedance Probabilities tool consists of maps for spatial comparisons. One objective of the network assessment is to determine if new sites are needed. In order to make that decision, it is helpful to have some estimation of the extreme pollution levels in areas where no monitors currently exist. The tool provides ozone and $PM_{2.5}$ maps of the contiguous US that can be used to make spatial comparisons regarding the probability of daily values exceeding a certain threshold.

The surface probability maps show the probability of exceeding the NAAQS, based on 2019 - 2021 monitoring data. The probability estimates alone should not be used to justify a new monitor. The maps should be used in conjunction with existing monitoring data. If a monitor has historically measured high values, then the probability map gives an indication of areas where you would expect to observe similar extreme values. This information, along with demographic and emissions data, could be used in a weight of evidence approach for proposing new monitor locations.

The Removal Bias tool is meant to aid in determining redundant sites. The bias estimation uses the nearest neighbors to each site to estimate the concentration at the location of the site if the site had been removed or 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 generate an estimated concentration higher than the measured concentration. Likewise, a negative average bias would suggest that the estimated concentration, based on neighboring sites, at the location of the site is smaller than the actual measured concentration.

PURPOSE/GOALS OF ASSESSMENT

The goals of the air monitoring network are to evaluate air quality to protect the health and quality of life for Philadelphia's residents from the adverse effects of air contaminants and to track progress on air quality initiatives. To achieve this, air monitors are placed in areas of high concentrations or high populations.

Currently, ozone is the only NAAQS for which Philadelphia County is in nonattainment. The Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE 8-hour Ozone Nonattainment Area consists of eighteen counties in Pennsylvania (Bucks, Montgomery, Chester, Delaware, and Philadelphia), New Jersey (Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem), Maryland (Cecil), and Delaware (Kent, New Castle, and Sussex).

Effective August 3, 2018 (83 FR 25776), the EPA classified the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE area (the Philadelphia Area) under the CAA as "Marginal" for the 2015 8-hour Ozone NAAQS. Classification of this area as a Marginal Ozone Nonattainment Area established a requirement that the area attain the 2015 Ozone NAAQS as expeditiously as practicable, but no later than three years from designation, i.e., August 3, 2021. Effective November 7, 2022 (87 FR 60897), the EPA determined that the Philadelphia Area failed to attain by the applicable Marginal attainment date. In that action, the EPA reclassified the Philadelphia Area as Moderate nonattainment for the 2015 Ozone NAAQS and established the attainment date as August 3, 2024. On July 17, 2024, the Commonwealth of Pennsylvania requested that the EPA reclassify the Philadelphia Area from Moderate to Serious.

Under the Clean Air Act (CAA) section 181(b)(3), the EPA granted the request from the Commonwealth of Pennsylvania and the States of New Jersey, Maryland, and Delaware to reclassify the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Ozone Nonattainment Area from "Moderate" to "Serious" for the 2015 8-hour ozone national ambient air quality standard (2015 Ozone NAAQS) under section 181(b)(3) of the CAA. This final rule is effective on July 30, 2024. Because of this action, the Philadelphia Area must now attain the 2015 Ozone NAAQS as expeditiously as practicable, but no later than nine years from the date of the initial designation as nonattainment, i.e., August 3, 2027.

Philadelphia is currently unclassifiable/attainment for the 2012 Annual $PM_{2.5}$ NAAQS of 12 $\mu g/m^3$. On March 6, 2024 (89 FR 16202), the EPA published a final updated Annual $PM_{2.5}$ NAAQS of 9 $\mu g/m^3$. Current annual $PM_{2.5}$ design values in Philadelphia would not meet this updated NAAQS. Philadelphia will be classified as attainment or nonattainment for this standard in 2026, two years after it was promulgated.

To be consistent with the previous 5-year assessments and with the area divisions in the NetAssess2025 tools, note that this assessment covers the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Core-Based Statistical Area (CBSA), which includes 11

counties in Pennsylvania (Bucks, Chester, Delaware, Montgomery, and Philadelphia), New Jersey (Burlington, Camden, Gloucester, and Salem), Delaware (New Castle), and Maryland (Cecil). The CBSA is not the same as the ozone nonattainment area.

This Assessment focuses mainly on $PM_{2.5}$ and ozone. The other criteria pollutants are briefly discussed.

NETWORK ASSESSMENT

1. $PM_{2.5}$

Monitoring Introduction

AMS currently monitors $PM_{2.5}$ (FRM, continuous/FEM, or speciated) at six monitoring sites[1]. The LAB Site (AQS ID 421010004) $PM_{2.5}$ was discontinued on 1/1/2019 and was restarted in 2022 due to issues upgrading to a continuous method. Table 2 includes the HUN monitor, a new FEM $PM_{2.5}$ monitor, which is not collecting data yet. Data collection at HUN is scheduled to start in July 2025. The focus of this discussion pertains to $PM_{2.5}$ monitors designated as the primary monitor at each location. Table 2 and Figure 16 show the $PM_{2.5}$ monitoring network in and around Philadelphia County. Tables 3 and 4 show trends for the annual and 24-hour averages for $PM_{2.5}$[2]. Tables 5 and 6 show trends of design values for $PM_{2.5}$. The most recent data includes the 4th quarter of 2024. Bolded numbers in each table represent the design value.

Table 2: $PM_{2.5}$ Monitoring Sites in Philadelphia

AMS Site	AQS Site ID	$PM_{2.5}$ Monitor	Latitude	Longitude	
LAB	421010004	Continuous	40.008889	-75.09778	Restarted 2022
NEW	421010048	Continuous; Speciated	39.991389	-75.080833	
RIT	421010055	Continuous; Speciated	39.922867	-75.186921	
FAB	421010057	Continuous	39.960048	-75.142614	
TOR	421010075	Continuous	40.054171	-74.985166	
MON	421010076	Continuous	39.988842	-75.207205	
HUN	421010068	Continuous	40.020568	-75.177729	Set to start July 2025

[1] The count does not include the Village Green monitor (VGR, a community site; see 2025-2026 Air Monitoring Network Plan for more information).
[2] $PM_{2.5}$ data downloaded from EPA's NetAssess2025 Tool on 3/14/2025. Data from 2024 downloaded from EPA Monitor Value Reports on 5/19/2025.

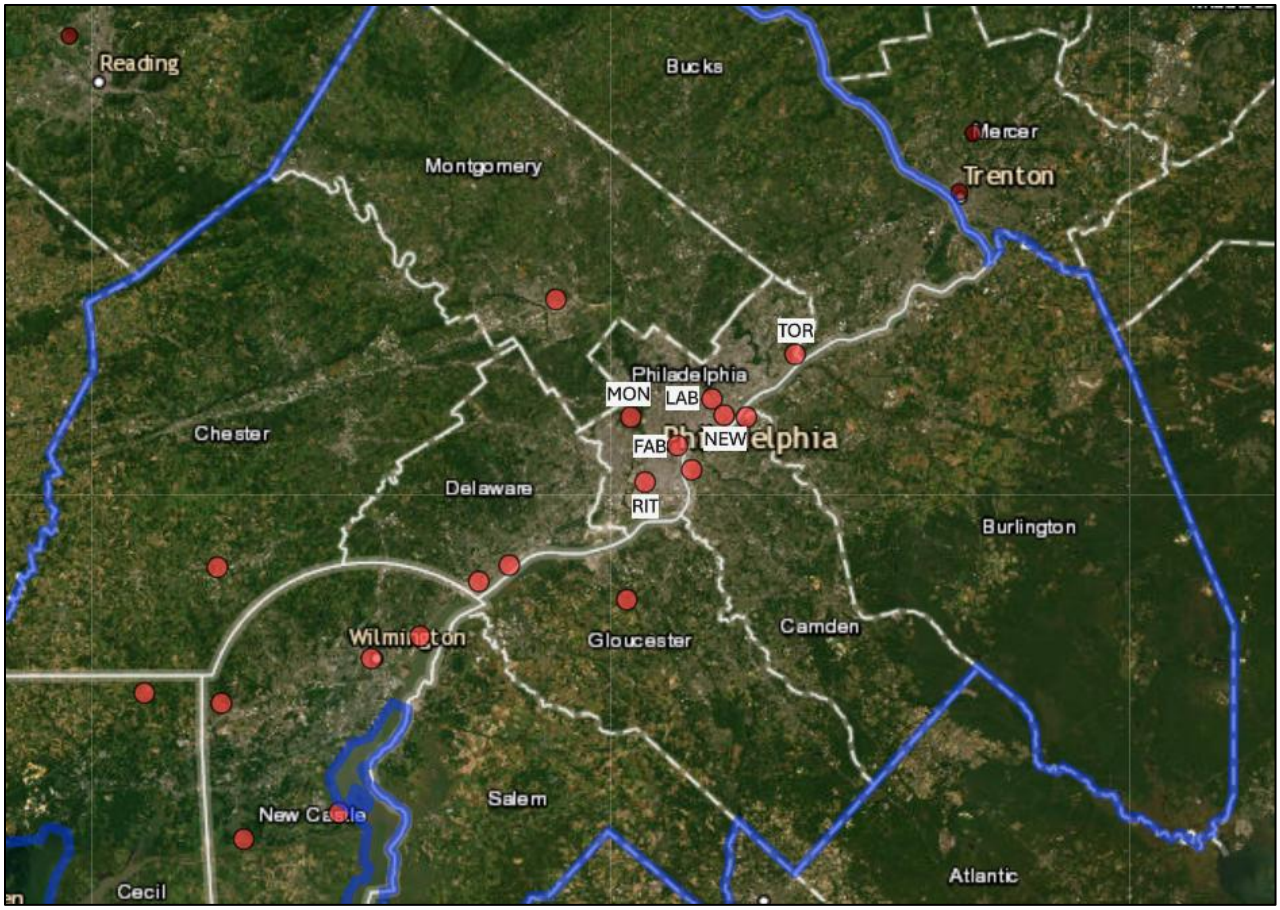


Figure 16: $PM_{2.5}$ Monitoring sites in Philadelphia and the CBSA

Table 3: $PM_{2.5}$ Annual Mean Value ($\mu g/m^3$)

YEAR	NEW	RIT	FAB	TOR	MON	LAB*
2010		11.3	10.9			10.7
2011		11.4	11.4			8.9
2012		10.3	10.1			9.7
2013	10.9	11.5	10.5			9.2
2014	11.0	12.7	11.9	11.8		9.8
2015	10.3	11.2	11.0	10.7	9.0	10.3
2016	9.8	10.5	9.4	9.4	8.2	8.0
2017	9.1	10.0	10.1	8.5	8.6	8.2
2018	8.6	9.8	8.0	9.7	8.7	8.1
2019	8.3	8.4	7.3	8.7	8.3	
2020	7.1	6.5	7.5	7.0	7.5	
2021	9.3	9.1	8.7	8.7	8.1	
2022	8.4	6.9	6.9	8.1	7.3	7.9
2023	10.7	10.9	9.9	13.4	9.2	12.9
2024	7.9	8.3	8.9	9.4	8.0	10.0

* LAB site discontinued on 1/1/2019 and restarted in 2022

Table 4: $PM_{2.5}$ 24-hour 98th Percentile ($\mu g/m^3$)

YEAR	NEW	RIT	FAB	TOR	MON	LAB*
2010		28.9	27.9			27.6
2011		30.6	30.5			23.7
2012		24.8	23.3			21.1
2013	35.3	29.8	25.5			35.1
2014	28.4	30.8	31.7	27.3		28.2
2015	26	30	27	27	30	27
2016	22	22	22	22	21	24
2017	22	20	20	22	20	22
2018	20	21	18	23	19	21
2019	25	22	18	22	20	
2020	18.9	16.5	16.3	23.7	17.3	
2021	24.1	23.7	23.6	21.4	20.5	
2022	18.7	16.3	16.2	20.9	17.9	19
2023	35.0	24.4	22.5	27.2	21.7	26.2
2024	20	19	21	23	21	27

* LAB site discontinued on 1/1/2019 and restarted in 2022

Table 5: $PM_{2.5}$ Annual Mean Design Value ($\mu g/m^3$) [3]

YEAR	NEW	RIT	FAB	TOR	MON	LAB*
2010		**12**	11.7			11.5
2011		**11.4**	11.1			10.1
2012		**11**	10.8			9.8
2013	10.9	**11**	10.8			9.3
2014	11	**11.3**	11	10.7		9.6
2015	*10.7*	**11.6**	11.3	10.7	*9*	9.7
2016	10.3	**11.4**	10.9	10.3	*8.6*	9.3
2017	9.6	**10.6**	10.2	9.5	*8.6*	*8.8*
2018	9.1	**10.1**	9.2	9.2	*8.5*	*8*
2019	8.6	**9.4**	8.5	*9*	*8.5*	
2020	7.9	8.3	*7.6*	**8.5**	8.2	
2021	*7.8*	8.1	*7.8*	**8.2**	8	*8.6*
2022	*8*	7.6	*7.7*	**8**	7.6	*8.2*
2023	9.7	9.3	*8.8*	**10**	8.5	*9.6*
2024	9.2	9	*8.8*	**10.3**	*8.5*	10.1

* LAB site discontinued on 1/1/2019 and restarted in 2022

Italics denote unofficial design value due to inadequate data completeness.

Table 6: $PM_{2.5}$ 24-hour 98th Percentile Design Value ($\mu g/m^3$) [3]

YEAR	NEW	RIT	FAB	TOR	MON	LAB*
2010		**31**	30			29
2011		**29**	**29**			26
2012		**28**	27			24
2013	*35*	**27**	**27**			**27**
2014	**32**	27	27	*21*		27
2015	**30**	29	*28*	*24*	*30*	*29*
2016	26	**27**	**27**	*23*	*25*	*25*
2017	23	**24**	23	**24**	*24*	**24**
2018	21	21	20	**22**	20	**22**
2019	21	21	19	**22**	20	
2020	21	20	*18*	**23**	19	
2021	**22**	21	*20*	**22**	19	*18*
2022	21	19	*19*	**22**	19	*18*
2023	24	24	23	**26**	22	*24*
2024	26	22	22	**27**	*22*	26

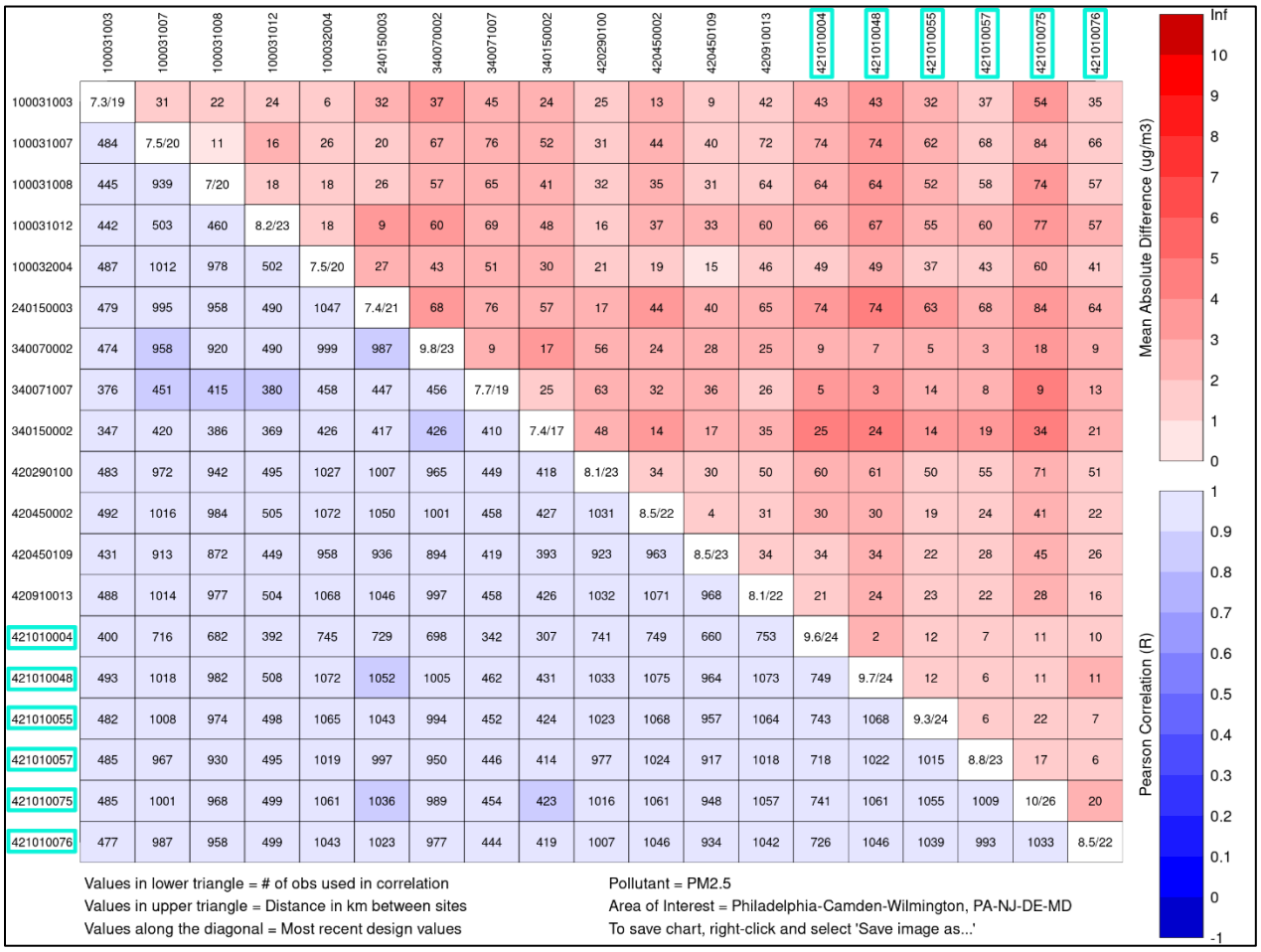
* LAB site discontinued on 1/1/2019 and restarted in 2022

Italics denote unofficial design value due to inadequate data completeness.

[3] Design Values from 2015 through 2024 downloaded from EPA Design Value Reports: https://www.epa.gov/air-trends/air-quality-design-values

Results of Correlation Matrix Tool

Figure 17 shows the correlation matrix generated with the Tools for all current $PM_{2.5}$ monitoring sites in the Philadelphia CBSA. Tables 7 - 12 show data generated in the correlation matrix.



	100031003	100031007	100031008	100031012	100032004	240150003	340070002	340071007	340150002	420290100	420450002	420450109	420910013	421010004	421010048	421010055	421010057	421010075	421010076
100031003	7.3/19	31	22	24	6	32	37	45	24	25	13	9	42	43	43	32	37	54	35
100031007	484	7.5/20	11	16	26	20	67	76	52	31	44	40	72	74	74	62	68	84	66
100031008	445	939	7/20	18	18	26	57	65	41	32	35	31	64	64	64	52	58	74	57
100031012	442	503	460	8.2/23	18	9	60	69	48	16	37	33	60	66	67	55	60	77	57
100032004	487	1012	978	502	7.5/20	27	43	51	30	21	19	15	46	49	49	37	43	60	41
240150003	479	995	958	490	1047	7.4/21	68	76	57	17	44	40	65	74	74	63	68	84	64
340070002	474	958	920	490	999	987	9.8/23	9	17	56	24	28	25	9	7	5	3	18	9
340071007	376	451	415	380	458	447	456	7.7/19	25	63	32	36	26	5	3	14	8	9	13
340150002	347	420	386	369	426	417	426	410	7.4/17	48	14	17	35	25	24	14	19	34	21
420290100	483	972	942	495	1027	1007	965	449	418	8.1/23	34	30	50	60	61	50	55	71	51
420450002	492	1016	984	505	1072	1050	1001	458	427	1031	8.5/22	4	31	30	30	19	24	41	22
420450109	431	913	872	449	958	936	894	419	393	923	963	8.5/23	34	34	34	22	28	45	26
420910013	488	1014	977	504	1068	1046	997	458	426	1032	1071	968	8.1/22	21	24	23	22	28	16
421010004	400	716	682	392	745	729	698	342	307	741	749	660	753	9.6/24	2	12	7	11	10
421010048	493	1018	982	508	1072	1052	1005	462	431	1033	1075	964	1073	749	9.7/24	12	6	11	11
421010055	482	1008	974	498	1065	1043	994	452	424	1023	1068	957	1064	743	1068	9.3/24	6	22	7
421010057	485	967	930	495	1019	997	950	446	414	977	1024	917	1018	718	1022	1015	8.8/23	17	6
421010075	485	1001	968	499	1061	1036	989	454	423	1016	1061	948	1057	741	1061	1055	1009	10/26	20
421010076	477	987	958	499	1043	1023	977	444	419	1007	1046	934	1042	726	1046	1039	993	1033	8.5/22

Figure 17: $PM_{2.5}$ FRM/FEM Daily Value Correlation Matric - Philadelphia CBSA
Philadelphia County sites marked in blue boxes: 421010004 (LAB), 421010048 (NEW), 421010055 (RIT), 421010057 (FAB), 421010075 (TOR), and 421010076 (MON)

In general, the Philadelphia sites had a high correlation with all sites. Almost every correlation was above 0.9 for all sites. Correlations from the 2025 network assessment are much higher than the 2020 network assessment, suggesting that concentrations are more evenly distributed across the CBSA than in the past.

Table 7: $PM_{2.5}$ Correlation Matrix for LAB (421010004)

Site 1	Site 2	Correlation	No. Obs	Mean Diff.	Distance (km)
LAB	100031003	0.968	400	2.93	43
LAB	100031007	0.912	716	2.67	74
LAB	100031008	0.943	682	2.70	64
LAB	100031012	0.949	392	2.61	66
LAB	100032004	0.966	745	1.85	49
LAB	240150003	0.900	729	3.89	74
LAB	340070002	0.935	698	2.69	9
LAB	340071007	0.949	342	3.90	5
LAB	340150002	0.914	307	4.29	25
LAB	420290100	0.959	741	2.05	60
LAB	420450002	0.950	749	2.33	30
LAB	420450109	0.967	660	1.92	34
LAB	420910013	0.969	753	1.97	21
LAB	NEW (421010048)	0.969	749	2.11	2
LAB	RIT (421010055)	0.970	743	1.70	12
LAB	FAB (421010057)	0.982	718	1.42	7
LAB	TOR (421010075)	0.987	741	1.40	11
LAB	MON (421010076)	0.974	726	1.59	10

Table 8: $PM_{2.5}$ Correlation Matrix for NEW (421010048)

Site 1	Site 2	Correlation	No. Obs	Mean Diff.	Distance (km)
NEW	100031003	0.968	493	3.20	43
NEW	100031007	0.918	1018	3.06	74
NEW	100031008	0.938	982	3.37	64
NEW	100031012	0.941	508	3.18	67
NEW	100032004	0.961	1072	2.22	49
NEW	240150003	0.899	1052	4.13	74
NEW	340070002	0.915	1005	2.89	7
NEW	340071007	0.935	462	3.75	3
NEW	340150002	0.905	431	4.33	24
NEW	420290100	0.956	1033	2.48	61
NEW	420450002	0.947	1075	2.35	30
NEW	420450109	0.970	964	2.06	34
NEW	420910013	0.969	1073	2.40	24
NEW	LAB (421010004)	0.969	749	2.11	2
NEW	RIT (421010055)	0.964	1068	1.96	12
NEW	FAB (421010057)	0.974	1022	1.84	6
NEW	TOR (421010075)	0.966	1061	1.78	11
NEW	MON (421010076)	0.967	1046	2.16	11

Table 9: $PM_{2.5}$ Correlation Matrix for RIT (421010055)

Site 1	Site 2	Correlation	No. Obs	Mean Diff.	Distance (km)
RIT	100031003	0.970	482	2.49	32
RIT	100031007	0.935	1008	2.11	62
RIT	100031008	0.951	974	2.20	52
RIT	100031012	0.959	498	2.42	55
RIT	100032004	0.966	1065	1.55	37
RIT	240150003	0.915	1043	3.14	63
RIT	340070002	0.914	994	2.63	5
RIT	340071007	0.940	452	2.93	14
RIT	340150002	0.924	424	3.32	14
RIT	420290100	0.968	1023	1.66	50
RIT	420450002	0.952	1068	1.96	19
RIT	420450109	0.970	957	1.53	22
RIT	420910013	0.967	1064	1.62	23
RIT	LAB (421010004)	0.970	743	1.70	12
RIT	NEW (421010048)	0.964	1068	1.96	12
RIT	FAB (421010057)	0.974	1015	1.26	6
RIT	TOR (421010075)	0.963	1055	1.91	22
RIT	MON (421010076)	0.965	1039	1.47	7

Table 10: $PM_{2.5}$ Correlation Matrix for FAB (421010057)

Site 1	Site 2	Correlation	No. Obs	Mean Diff.	Distance (km)
FAB	100031003	0.982	485	1.81	37
FAB	100031007	0.939	967	1.76	68
FAB	100031008	0.960	930	1.85	58
FAB	100031012	0.953	495	2.33	60
FAB	100032004	0.976	1019	1.28	43
FAB	240150003	0.916	997	2.79	68
FAB	340070002	0.918	950	2.46	3
FAB	340071007	0.940	446	2.52	8
FAB	340150002	0.926	414	3.09	19
FAB	420290100	0.973	977	1.37	55
FAB	420450002	0.967	1024	1.64	24
FAB	420450109	0.986	917	1.12	28
FAB	420910013	0.987	1018	1.14	22
FAB	LAB (421010004)	0.982	718	1.42	7
FAB	NEW (421010048)	0.974	1022	1.84	6
FAB	RIT (421010055)	0.974	1015	1.26	6
FAB	TOR (421010075)	0.979	1009	1.73	17
FAB	MON (421010076)	0.983	993	1.03	6

Table 11: $PM_{2.5}$ Correlation Matrix for TOR (421010075)

Site 1	Site 2	Correlation	No. Obs	Mean Diff.	Distance (km)
TOR	100031003	0.967	485	3.56	54
TOR	100031007	0.908	1001	2.89	84
TOR	100031008	0.939	968	3.03	74
TOR	100031012	0.933	499	3.23	77
TOR	100032004	0.957	1061	2.05	60
TOR	240150003	0.877	1036	3.97	84
TOR	340070002	0.906	989	3.06	18
TOR	340071007	0.923	454	4.24	9
TOR	340150002	0.878	423	4.72	34
TOR	420290100	0.949	1016	2.33	71
TOR	420450002	0.951	1061	2.22	41
TOR	420450109	0.966	948	2.01	45
TOR	420910013	0.967	1057	2.26	28
TOR	LAB (421010004)	0.987	741	1.40	11
TOR	NEW (421010048)	0.966	1061	1.78	11
TOR	RIT (421010055)	0.963	1055	1.91	22
TOR	FAB (421010057)	0.979	1009	1.73	17
TOR	MON (421010076)	0.966	1033	2.09	20

Table 12: $PM_{2.5}$ Correlation Matrix for MON (421010076)

Site 1	Site 2	Correlation	No. Obs	Mean Diff.	Distance (km)
MON	100031003	0.988	477	1.60	35
MON	100031007	0.942	987	1.80	66
MON	100031008	0.964	958	1.82	57
MON	100031012	0.960	499	2.22	57
MON	100032004	0.975	1043	1.32	41
MON	240150003	0.914	1023	2.72	64
MON	340070002	0.914	977	2.45	9
MON	340071007	0.930	444	2.23	13
MON	340150002	0.935	419	2.74	21
MON	420290100	0.974	1007	1.26	51
MON	420450002	0.965	1046	1.76	22
MON	420450109	0.981	934	1.22	26
MON	420910013	0.985	1042	1.04	16
MON	LAB (421010004)	0.974	726	1.59	10
MON	NEW (421010048)	0.967	1046	2.16	11
MON	RIT (421010055)	0.965	1039	1.47	7
MON	FAB (421010057)	0.983	993	1.03	6
MON	TOR (421010075)	0.966	1033	2.09	20

Results of Area Served Tool

Figure 18 shows the Area Served polygons for the six $PM_{2.5}$ monitoring sites in Philadelphia. The population statistics are shown in Table 13. Note that these population statistics cover the entire area served by the monitor, not just the area within Philadelphia. The area served by LAB has the highest percentage of ethnic minority population (67%). The area served by TOR has the highest percentage of people 65 years and older (20%), while the area served by NEW has the highest percentage 19 years old and younger (29%).

Figure 18: $PM_{2.5}$ Monitors Area Served

Table 13: $PM_{2.5}$ Monitors Area Served Population Statistics (Voronoi Polygon)

SITE	TOTAL POPULATION (2020)	TOTAL AGE 19 AND UNDER	TOTAL AGE 65 AND UP	TOTAL MINORITY	AREA (km^2)	POPULATION DENSITY (per km^2)
LAB	563801	150867	82529	380356	164	3438
NEW	52069	14912	5914	33588	19	2740
RIT	311859	70973	41311	195910	89	3504

FAB	236670	40787	29416	119725	28	8453
TOR	730455	165168	142664	221052	1103	662
MON	607978	143374	97460	382294	175	3474

Results of Exceedance Probabilities Tool

Surface daily exceedance probability maps for the continental United States and the Philadelphia area are shown in Figures 19 and 20. The maps are based on 2019 - 2021 monitoring data.

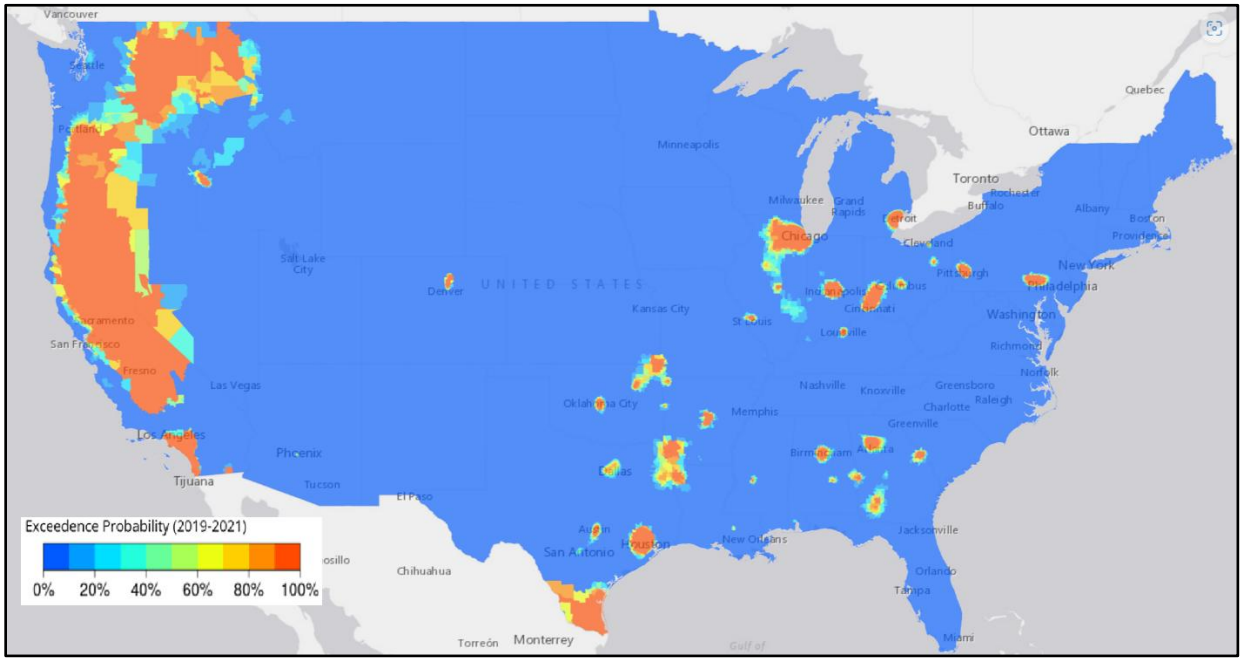


Figure 19: Daily $PM_{2.5}$ surface exceedance probability map for Continental U.S.

The map in Figure 20 shows the $PM_{2.5}$ exceedance probability in the Philadelphia area is fairly low (around 10%). This suggests that the current monitoring network provides a generally representative picture of $PM_{2.5}$ concentrations in the region.

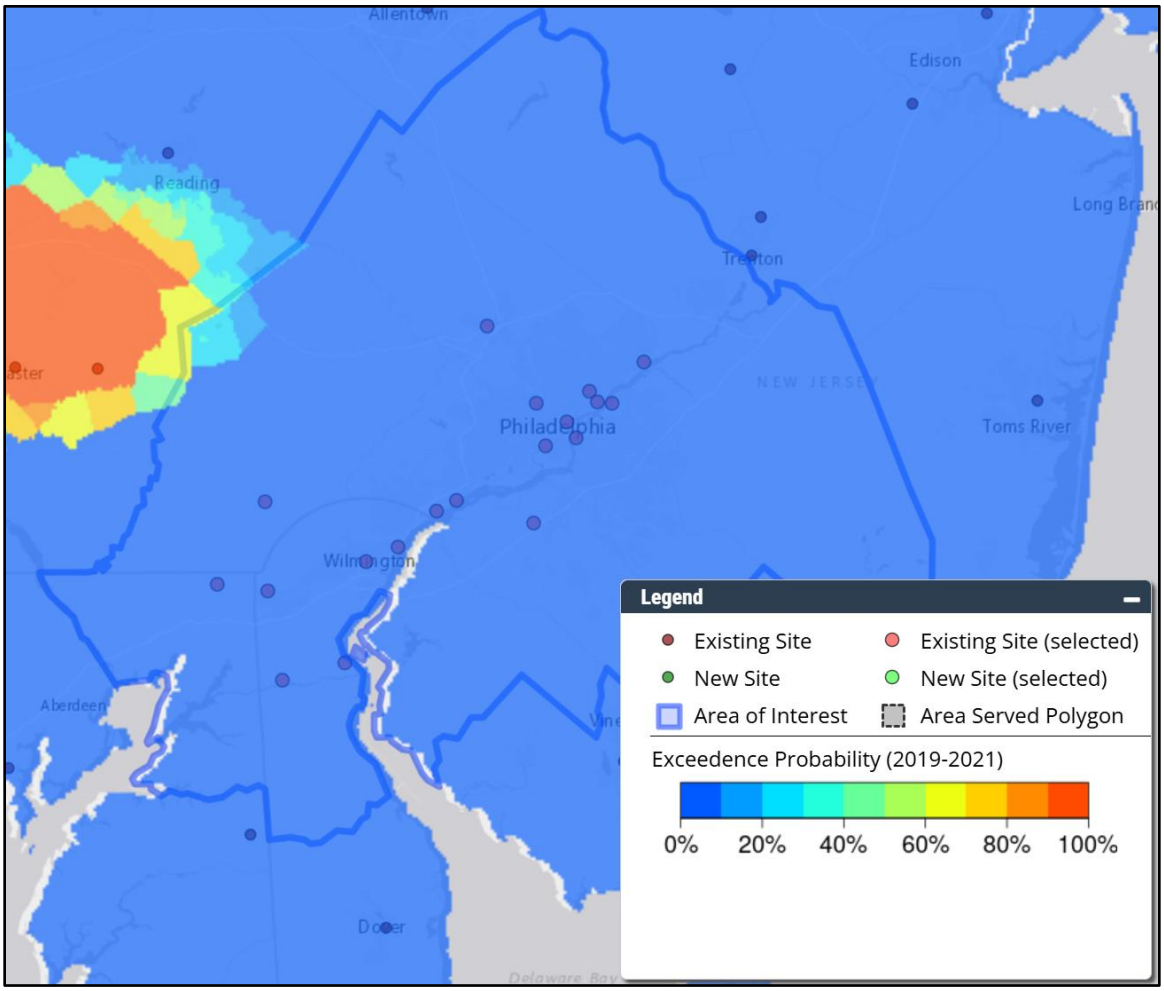


Figure 20: Daily $PM_{2.5}$ Surface Exceedance Probability Map for Philadelphia Area

Results of Removal Bias Tool

The results from the removal bias tool are shown in Figure 21 and Table 14. NEW and TOR sites had high negative mean removal bias. This means that estimated concentrations in these areas would have been significantly lower than what the monitors measured. Therefore, these monitors are necessary to capture high concentrations of $PM_{2.5}$. RIT had a relatively small negative mean removal bias. LAB, FAB, and MON sites had a slightly positive mean removal bias. This means if these sites were removed, the estimated concentrations at these areas would be slightly higher than measured. These monitors are important to represent accurate concentrations in these neighborhoods and not estimate worse concentrations than what is actually present. Each monitor had a noticeable removal bias, meaning that estimated concentrations at each location would have been different than the actual concentration. Therefore, each of these monitors has value to the neighborhoods in which they are located.

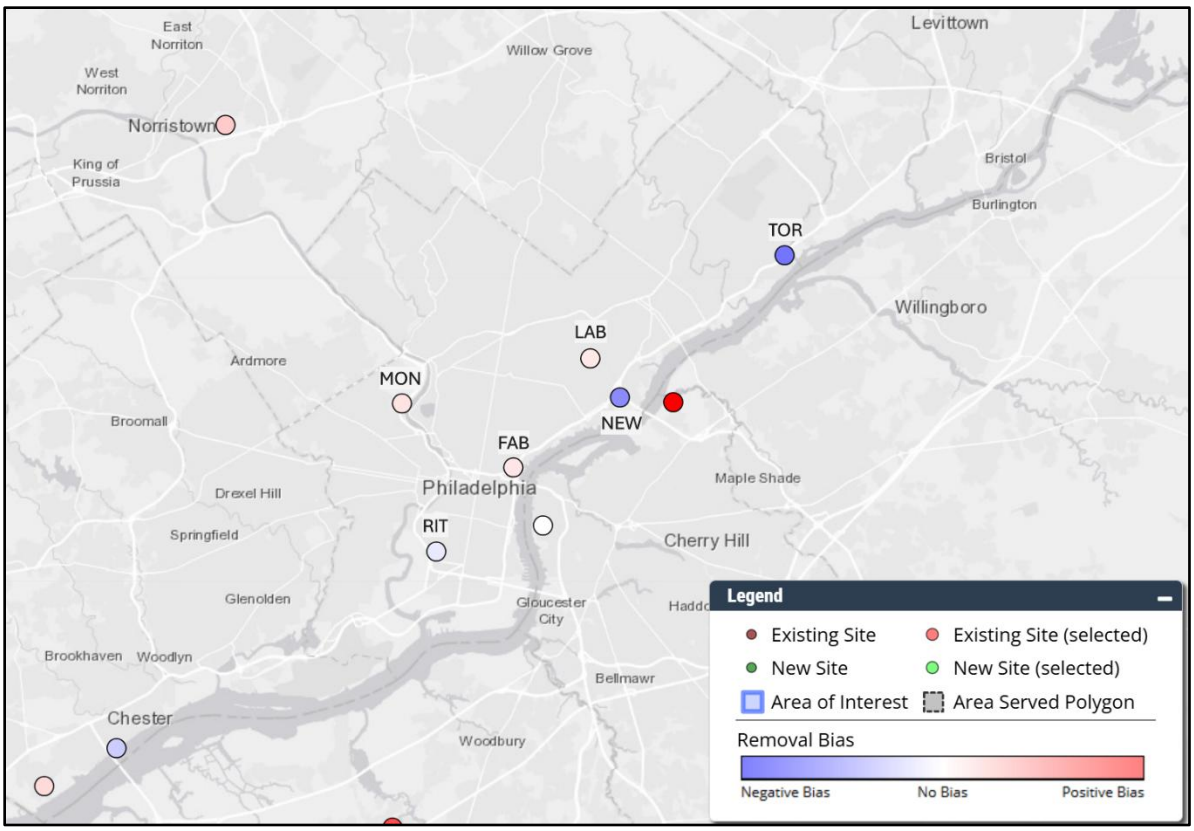


Figure 21: $PM_{2.5}$ Removal Bias Map for Philadelphia

Table 14: $PM_{2.5}$ Removal Bias Summary for Philadelphia Sites

SITE ID	MEAN REMOVAL BIAS ($\mu g/m^3$)	MIN REMOVAL BIAS ($\mu g/m^3$)	MAX REMOVAL BIAS ($\mu g/m^3$)	REMOVAL BIAS STANDARD DEVIATION	NEIGHBORS INCLUDED	MEAN RELATIVE REMOVAL BIAS (%)	MIN RELATIVE REMOVAL BIAS (%)	MAX RELATIVE REMOVAL BIAS (%)
LAB	0.32	-9.1	12.4	2.33	6	6.7	-38	200
NEW	-1.6	-24.4	5.2	2.4	4	-12.8	-79	71
RIT	-0.31	-20.6	6.2	2.35	5	2.2	-69	119
FAB	0.35	-33.3	8.1	2.14	5	7.1	-44	192
TOR	-1.92	-43.3	6.7	2.77	6	-16.3	-76	78
MON	0.39	-19.7	13.7	1.75	5	6.3	-75	144

$PM_{2.5}$ Discussion and Future Plans: 2025 – 2030

On January 15, 2015, EPA published the final rule (80 FR 2206) designating Philadelphia County as Unclassifiable/Attainment for the 2012 annual $PM_{2.5}$ NAAQS of 12 $\mu g/m^3$.

On April 12, 2015, EPA published the final rule (80 FR 22112) determining that the Pennsylvania portion of the Philadelphia-Wilmington, PA-NJ-DE Nonattainment Area (Philadelphia Area) attained the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS.

On February 7, 2024, EPA established a new Annual $PM_{2.5}$ Standard of 9.0 $\mu g/m^3$. Since January 15, 2015, Philadelphia has been designated as Unclassifiable/Attainment for the

2012 $PM_{2.5}$ NAAQS. Philadelphia will have to show attainment with the new standard two years after it was implemented on May 6, 2024. If Philadelphia does not show attainment for the new standard, it will be reclassified as nonattainment.

AMS' commitment to EPA requires five $PM_{2.5}$ monitoring sites. As of June 30, 2025, AMS has six operating FEM/FRM $PM_{2.5}$ monitors. AMS will begin monitoring $PM_{2.5}$ at a seventh FEM monitor within the next month. Over the next five years, AMS plans to:

- Deploy low/medium cost real-time $PM_{2.5}$ sensors to provide air quality measurements to the residents of Philadelphia at high spatial resolution. These monitors do not contribute to regulatory assessments but are valuable for communities in Philadelphia.

2. OZONE

Monitoring Introduction

AMS currently monitors ozone at three monitoring sites: LAB, NEA, and NEW. Table 15 and Figure 22 show the ozone monitoring network in and around Philadelphia County. Data for trends for the 4th highest 8-hour values and design values are shown in Tables 16 and 17[4]. The most recent data includes the 4th quarter of 2024. As the values in Table 17 indicate, the NEA site generally had the highest ozone design values. However, NEW has recently matched some of the high values shown at NEA. High concentrations at these sites are expected since they are downwind of the city during the summer season. The summer wind rose figure in the Meteorological Summary section shows that wind from the Center City would travel northeast towards these monitors. NEA is an appropriate downwind monitor because it is downwind of almost the entire city during the ozone season.

Table 15: Ozone Monitoring Sites in Philadelphia

AMS Site	AQS Site ID	Latitude	Longitude
LAB	421010004	40.008889	-75.097780
NEA	421010024	40.076389	-75.011944
NEW	421010048	39.991389	-75.080833

[4] Data downloaded from www.epa.gov/airdata on 3/17/2025.

Table 16: Ozone 4th Highest 8-Hour Values (ppm)

Year	LAB	NEA	NEW
2007	0.073	0.095	
2008	0.062	0.087	
2009	0.059	0.072	
2010	0.077	0.088	
2011	0.070	0.089	
2012	0.065	0.085	
2013	0.047	0.068	0.036*
2014	0.058	0.072	0.068
2015	0.057	0.079	0.078
2016	0.069	0.080	0.076
2017	0.042	0.076	0.076
2018	0.071	0.079	0.076
2019	0.067	0.071	0.072
2020	0.064	0.070	0.067
2021	0.068	0.072	0.073
2022	0.061	0.068	0.066
2023	0.064	0.072	0.071
2024	0.072	0.070	0.075

*NEW site had incomplete data in 2013

Table 17: Ozone 4th Highest 8-Hour Design Values (ppm) [5]

Year	LAB	NEA	NEW
2007 - 2009	0.064	**0.084**	
2008 - 2010	0.066	**0.082**	
2009 - 2011	0.068	**0.083**	
2010 - 2012	0.070	**0.087**	
2011 - 2013	0.060	**0.080**	
2012 - 2014	0.056	**0.075**	
2013 - 2015	0.054	**0.073**	0.061
2014 - 2016	0.061	**0.077**	0.074
2015 - 2017	*0.056*	**0.078**	0.076
2016 - 2018	*0.061*	**0.078**	0.076
2017 - 2019	*0.060*	**0.075**	0.074
2018 – 2020	*0.067*	**0.073**	0.071
2019 – 2021	0.066	**0.071**	**0.071**
2020 – 2022	0.064	**0.070**	0.068
2021 - 2023	0.064	**0.070**	**0.070**
2022 - 2024	0.065	**0.070**	**0.070**

Italics denote unofficial design value due to inadequate data completeness.

[5] Design Values from 2015 through 2024 downloaded from EPA Design Value Reports: https://www.epa.gov/air-trends/air-quality-design-values

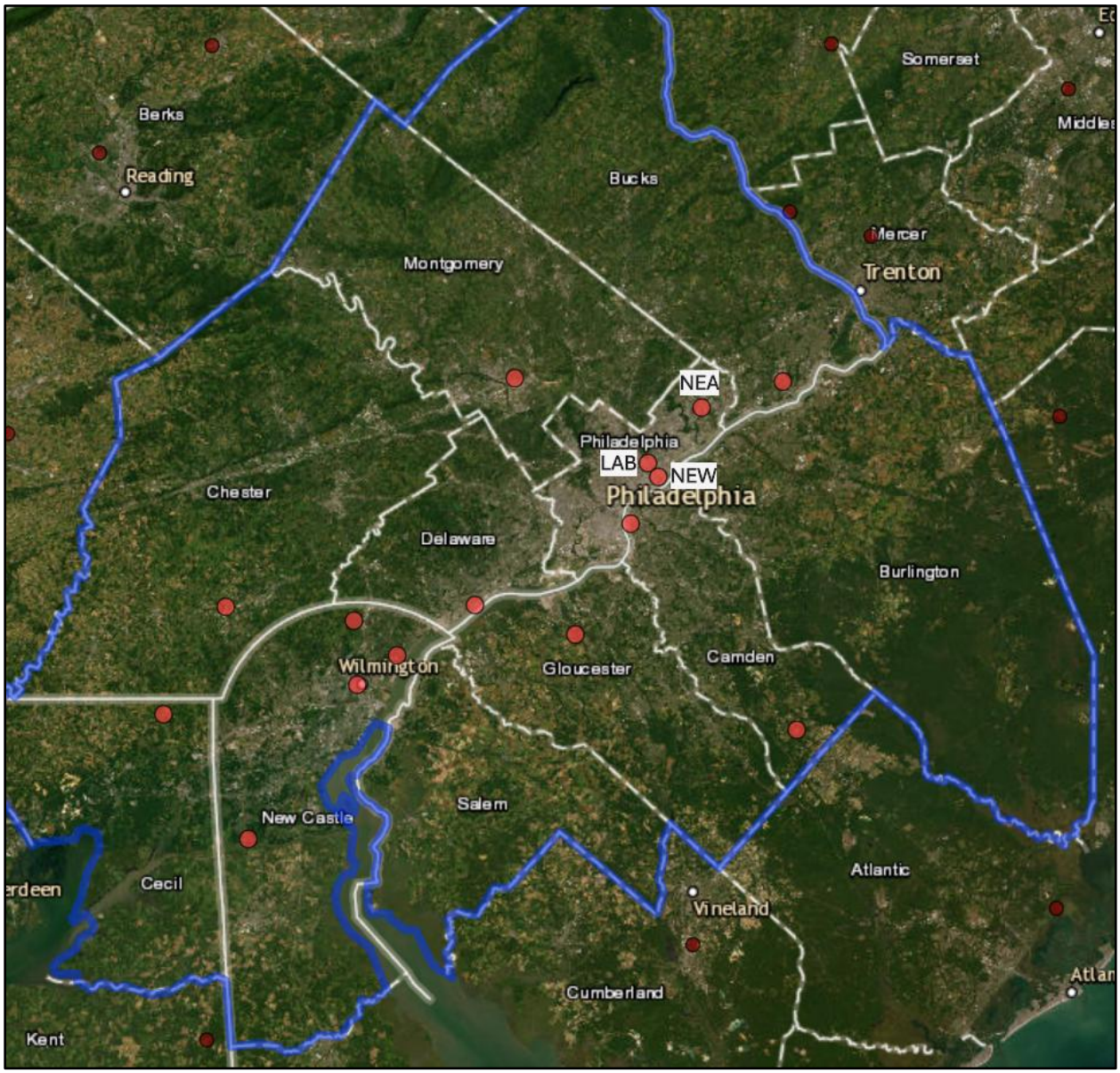


Figure 22: Ozone Monitoring Sites in and around Philadelphia County

Results of Correlation Matrix Tool

Tables 18, 19, and 20, and Figure 23 show the correlation matrix for all ozone monitoring sites in the Philadelphia CBSA. Table 19 shows that NEA is highly correlated with most monitors in the CBSA. NEA is usually the site with the highest ozone in Philadelphia and one of the highest ozone sites in the region. The LAB and NEW sites are also highly correlated with most sites in the CBSA. This pattern aligns with the regional nature of ozone pollution, as well as the geographic proximity of these monitors, which contributes to the observed consistency in ozone levels.

Table 18: Ozone Correlation Matrix for LAB (421010004)

Site 1	Site 2	Correlation	n	Mean Diff	Distance (km)
LAB	100031007	0.917	886	0.0058	74
LAB	100031010	0.910	926	0.0055	45
LAB	100031013	0.939	978	0.0050	43
LAB	100032004	0.952	967	0.0044	49
LAB	240150003	0.905	701	0.0058	74
LAB	340070002	0.963	1044	0.0042	9
LAB	340071001	0.873	815	0.0047	41
LAB	340150002	0.931	738	0.0050	25
LAB	420170012	0.956	792	0.0048	21
LAB	420290100	0.884	727	0.0051	60
LAB	420450002	0.936	639	0.0052	30
LAB	420910013	0.942	743	0.0043	21
LAB	NEA (421010024)	0.976	1037	0.0052	10
LAB	NEW (421010048)	0.972	1031	0.0036	2

Table 19: Ozone Correlation Matrix for NEA (421010024)

Site 1	Site 2	Correlation	n	Mean Diff	Distance (km)
NEA	100031007	0.912	887	0.0039	84
NEA	100031010	0.904	933	0.0043	55
NEA	100031013	0.933	980	0.0036	53
NEA	100032004	0.952	974	0.0032	59
NEA	240150003	0.897	693	0.0040	83
NEA	340070002	0.962	1052	0.0030	18
NEA	340071001	0.869	807	0.0051	45
NEA	340150002	0.918	727	0.0037	35
NEA	420170012	0.979	794	0.0021	12
NEA	420290100	0.885	727	0.0049	70
NEA	420450002	0.939	639	0.0034	41
NEA	420910013	0.945	742	0.0034	26
NEA	LAB (421010004)	0.976	1037	0.0052	10
NEA	NEW (421010048)	0.978	1038	0.0027	11

Table 20: Ozone Correlation Matrix for NEW (421010048)

Site 1	Site 2	Correlation	n	Mean Diff	Distance (km)
NEW	100031007	0.924	885	0.0044	74
NEW	100031010	0.908	927	0.0046	45
NEW	100031013	0.939	975	0.0039	43
NEW	100032004	0.959	966	0.0029	49
NEW	240150003	0.902	692	0.0044	74
NEW	340070002	0.964	1045	0.0031	7
NEW	340071001	0.881	807	0.0045	39
NEW	3401-0002	0.929	731	0.0036	24
NEW	420170012	0.978	792	0.0023	21
NEW	420290100	0.880	729	0.0052	61
NEW	420450002	0.950	641	0.0035	30
NEW	420910013	0.937	745	0.0036	24
NEW	LAB (421010004)	0.972	1031	0.0036	2
NEW	NEA (421010024)	0.978	1038	0.0027	11

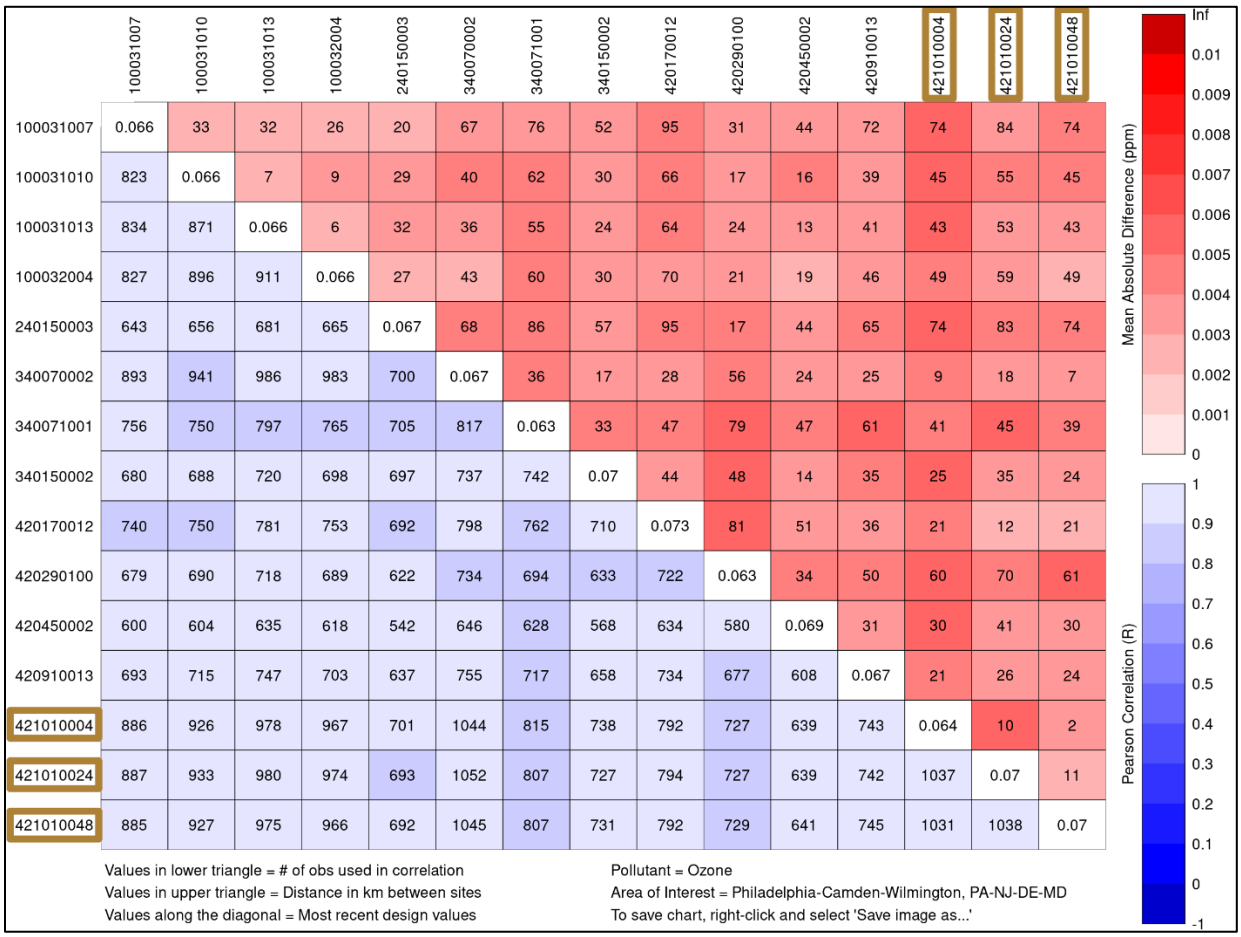


Figure 23: Ozone Correlation Matrix
Philadelphia County sites marked in brown boxes: 421010004 (LAB), 421010024 (NEA), and 421010048 (NEW)

Results of Area Served Tool

Figure 24 shows the results of the Area Served tool for the three ozone monitoring sites in Philadelphia. The population statistics are shown in Table 21. Note that these population statistics cover the entire area served by the monitor, not just the area within Philadelphia. The area served by LAB has the highest percentage of ethnic minority population (74%). The area served by NEA has the highest percentage of people 65 years and older (19%), while the area served by LAB had the highest population of people 19 and younger (26%). South Philadelphia, West Philadelphia, and Center City are not served by an ozone monitor in Philadelphia but are served by a monitor in New Jersey (Site ID: 340071001), directly across the Delaware River as shown in Figure 24.

Figure 24: Ozone Monitors Area Served

Table 21: Ozone Monitors Area Served Population Statistics (Voronoi Polygon)

SITE	TOTAL POPULATION (2020)	TOTAL AGE 19 AND UNDER	TOTAL AGE 65 AND UP	TOTAL MINORITY	AREA (km^2)	POPULATION DENSITY (per km^2)
LAB	691914	180251	99657	512354	157	4407
NEA	511146	117607	98415	148725	371	1378
NEW	247708	61596	40334	105008	166	1492

Results of Exceedance Probabilities Tool

Surface exceedance probability maps for the continental United States and the Philadelphia area are shown in Figures 25 and 26 (8-hour Ozone NAAQS 0.070 ppm or 70 ppb). The maps use data from 2019 – 2021 and provide information about the spatial distribution of the 8-hour average ozone values. The maps are intended to be used for spatial comparison.

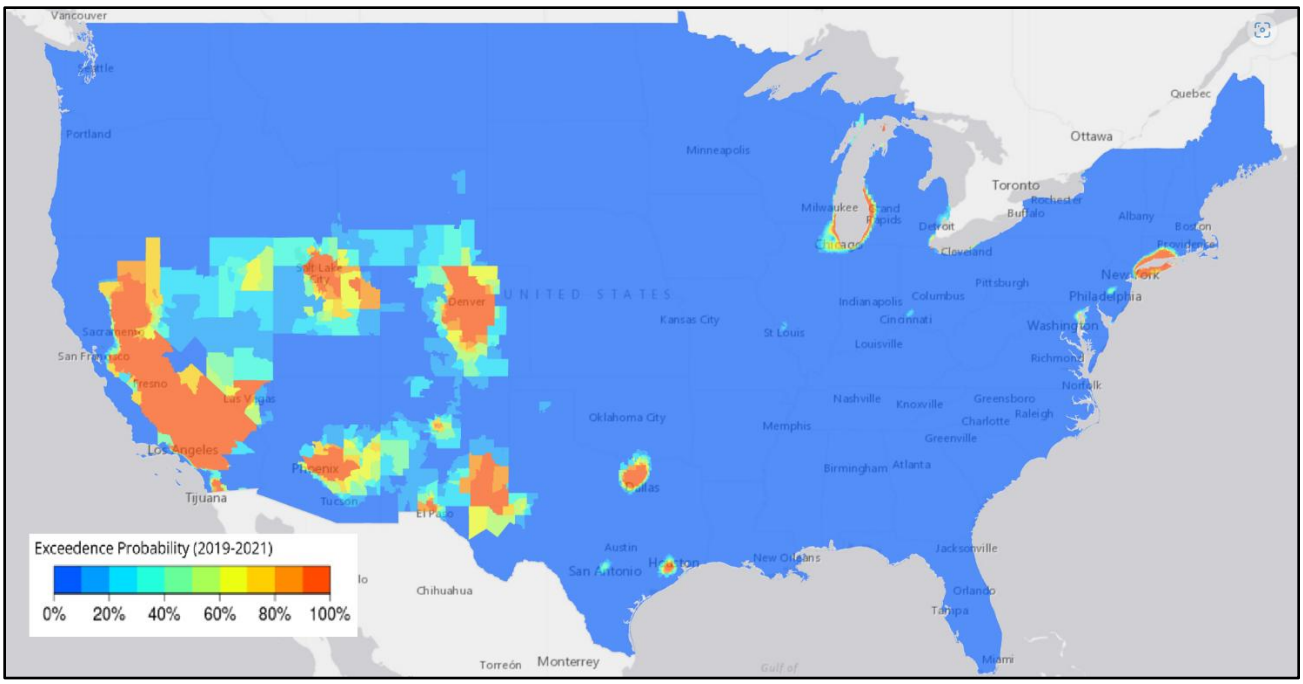


Figure 25: Ozone 8-Hour (70 ppb) Exceedance Probability Map for Continental US

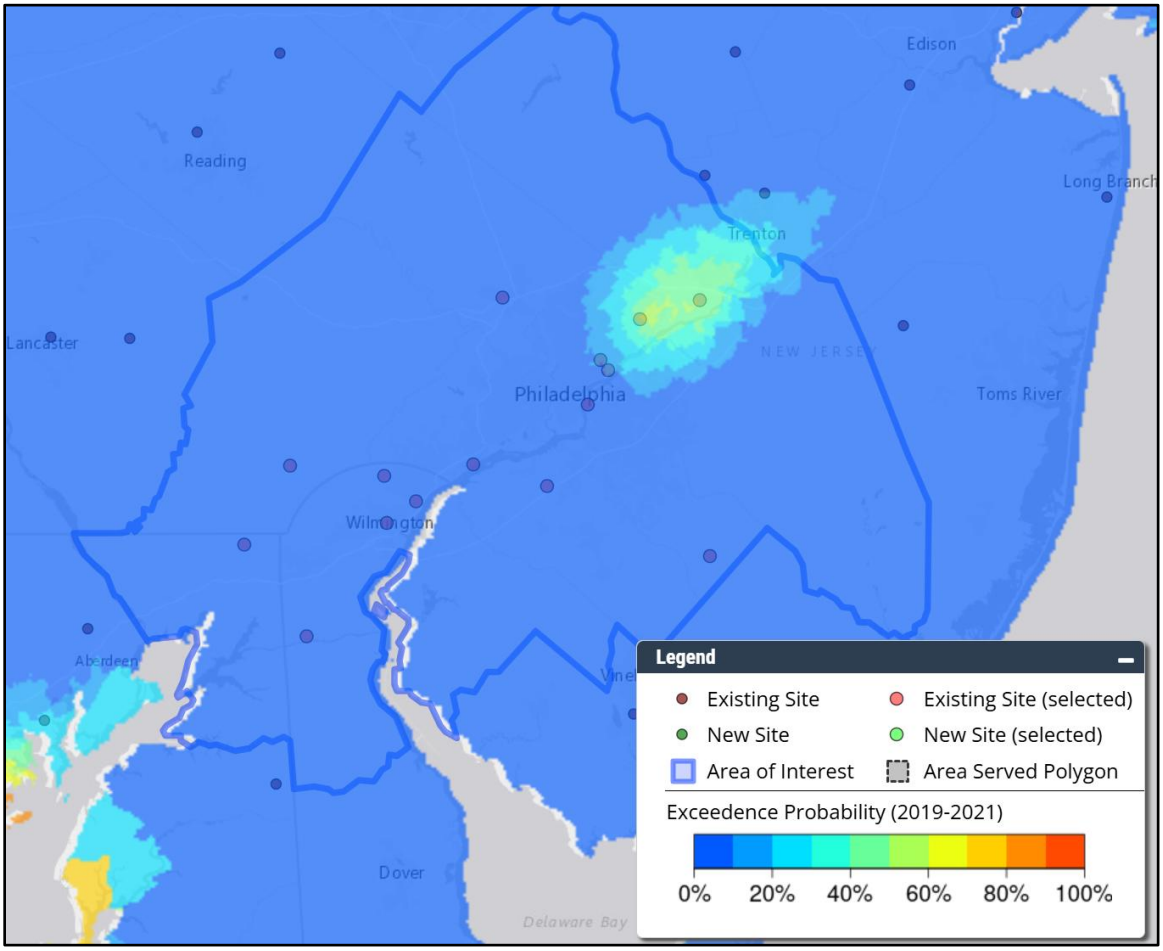


Figure 26: Ozone 8-Hour (70 ppb) Exceedance Probability Map for Philadelphia Area

The map in Figure 26 indicates the ozone exceedance probability in the Northeast Philadelphia area is relatively high (around 65%). While the exceedance probability is high, progress has been made from the 2014 – 2016 probability of 90% throughout the region. The exceedance probability is highest around the NEA monitor, which usually has the highest ozone concentration in Philadelphia. The exceedance probability is also high near the Bristol Monitor (Site ID: 420170012) which often shows the highest ozone concentration in the CBSA.

Results of Removal Bias Tool

Figure 27 and Table 22 show the removal bias tool results for the three ozone monitors in Philadelphia.

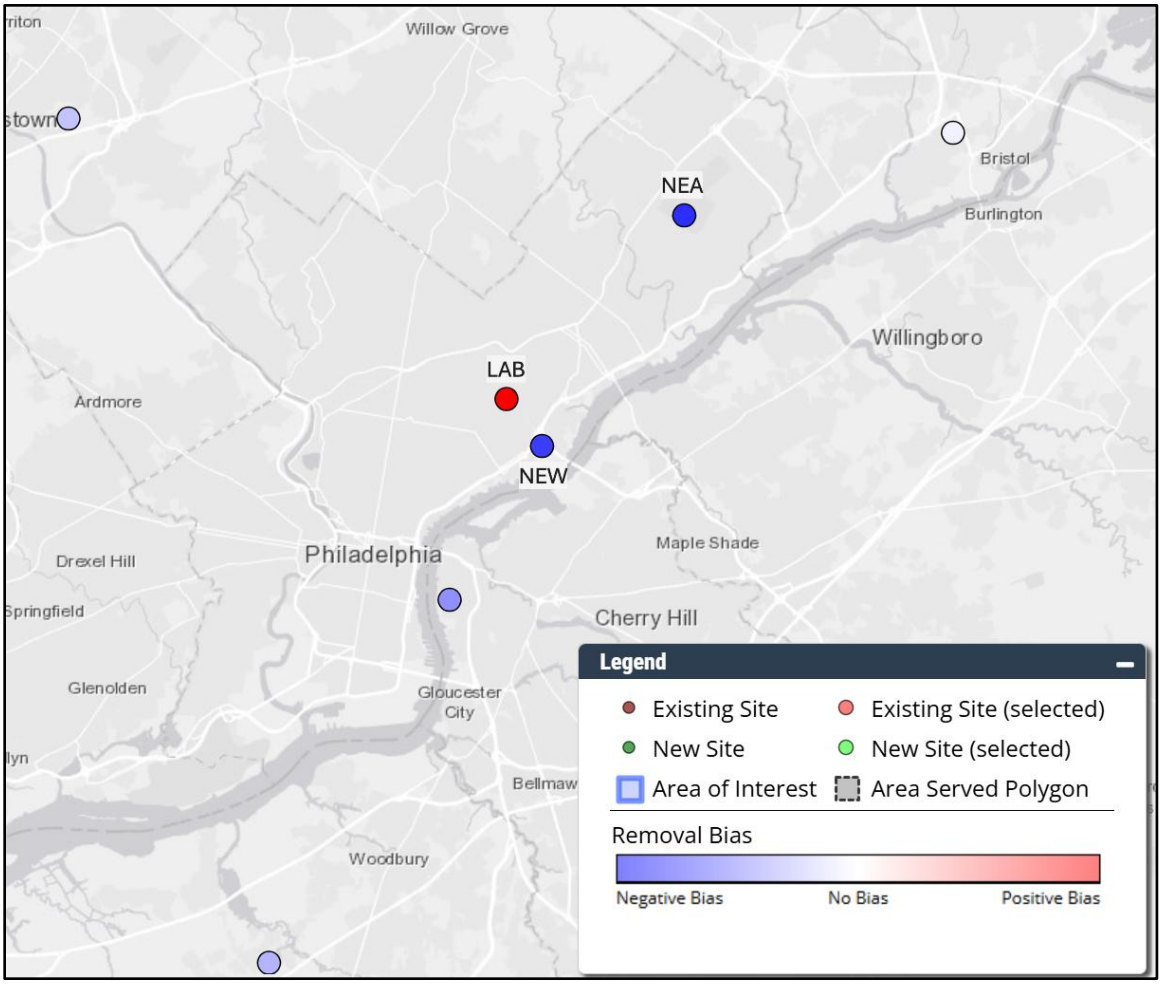


Figure 27: Ozone Removal Bias Map for Philadelphia

Table 22: Ozone Removal Bias Summary for Philadelphia

SITE ID	MEAN REMOVAL BIAS (ppm)	MIN REMOVAL BIAS (ppm)	MAX REMOVAL BIAS (ppm)	REMOVAL BIAS STANDARD DEVIATION	NEIGHBORS INCLUDED	MEAN RELATIVE REMOVAL BIAS (%)	MIN RELATIVE REMOVAL BIAS (%)	MAX RELATIVE REMOVAL BIAS (%)
LAB	0.0034	-0.017	0.02	0.003	4	12.5	-36	343
NEA	-0.0028	-0.011	0.01	0.0021	5	-7.3	-58	219
NEW	-0.0026	-0.017	0.02	0.0031	5	-6.7	-61	72

The above data indicates that LAB has a high positive mean removal bias and NEA and NEW have a high negative mean removal bias. This means if the LAB monitor did not exist, the estimated ozone concentration in that location would be significantly overestimated. If the NEW and NEA monitors did not exist, the estimated concentration in those areas would be significantly underestimated. The LAB monitor has a positive removal bias because it consistently measures lower ozone concentrations than the nearby NEW and NEA monitors.

Photochemical Assessment Monitoring Station (PAMS) Assessment

In 2015, significant changes were made to the PAMS requirements as part of the 2015 Ozone NAAQS review (40 CFR, Part 58, Appendix D). New PAMS requirements called for measurement of ozone precursors and meteorological conditions at existing NCore sites in CBSAs with more than 1 million people. Philadelphia operates one NCore site (NEW).

The new PAMS requirements were designed to create a database of ozone precursors and meteorological data to help model ozone formation, transport, and impacts. Updated PAMS monitoring was required to start by June 1, 2019. AMS began monitoring required PAMS measurements but encountered several recurring issues with some of the required meteorological measurements.

Devices that measure rainfall, ultraviolet radiation, and solar radiation did not provide reliable data and new measurement devices have been purchased. At the site, a WXT520 measures wind speed, wind direction, temperature, humidity, and barometric pressure. This device is seven years old and will be replaced in the next five years. The ceilometer at the site, which is used to measure atmospheric mixing height, has had issues pertaining to automatic data uploads. Despite data upload issues, the ceilometer collects data reliably. Currently, AMS does not plan to replace the ceilometer but may do so in the future. AMS meets the monitoring requirements for ozone precursors, including nitrogen oxides, VOCs, carbonyls, and ozone. AMS is working towards consistently meeting all the requirements for the PAMS site.

Ozone Discussion and Future Plans: 2025 – 2030

On August 3, 2018, the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE area (the Philadelphia Area) was classified as “Marginal” nonattainment for the 2015 8-hour Ozone NAAQS. Effective November 7, 2022, the EPA determined that the Philadelphia Area

failed to attain by the applicable Marginal attainment date. The EPA reclassified the Philadelphia Area as "Moderate" nonattainment for the 2015 Ozone NAAQS and established the attainment date as August 3, 2024. On July 17, 2024, the Commonwealth of Pennsylvania requested that the EPA reclassify the Philadelphia Area from Moderate to Serious.

The EPA granted the request to reclassify the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Ozone Nonattainment Area from "Moderate" to "Serious" for the 2015 8-hour Ozone NAAQS. This final rule is effective on July 30, 2024. Because of this action, the Philadelphia Area must now attain the 2015 Ozone NAAQS as expeditiously as practicable, but no later than nine years from the date of the initial designation as nonattainment, i.e., August 3, 2027.

Over the next five years, AMS plans to make the following changes to the monitoring network:

- Evaluate moving the ozone monitor at LAB to another location. AMS may move the monitor to the new HUN site in north Philadelphia or the RIT or SWA site in south Philadelphia.
    - Monitoring ozone at SWA or RIT would allow AMS to show ozone concentrations upwind of most of Philadelphia.
    - Monitoring ozone at SWA or RIT would provide an ozone monitor that would serve South Philadelphia.
- Rather than move the LAB ozone monitor, AMS may install new ozone FEM monitors.
    - Potentially in South Philadelphia to provide a representative monitor for South Philadelphia residents and an upwind monitor for ozone concentrations.
    - Potentially in West Philadelphia where there are several Environmental Justic communities.
- Replace and repair measurement devices at NEW to meet the requirements for PAMS monitoring.
- Implement the 2015 Ozone SIP revisions in efforts to achieve attainment.

3. OTHER CRITERIA POLLUTANTS

Discussion and Future Plans

Table 23 shows the maximum concentrations summary for CO, NO_2, SO_2, PM_{10}, and Pb from 2020 – 2024[6]. The design values for these criteria pollutants are well below the NAAQS. Monitoring locations, requirements and future plans are documented in the Air Monitoring Network Plan.

[6] Air Quality Statistics Report from www.epa.gov/airdata, downloaded 3/17/2025

In 2023, PM_{10} concentrations were above the NAAQS. Widespread wildfires in Canada caused heavy smoke to impact Philadelphia in the throughout the summer of 2023. While the 2023 PM_{10} concentration was high, the design value, averaged over 3 years, was well below the NAAQS.

With concentration consistently well below the NAAQS, the network for CO and SO_2 monitoring will be evaluated for its need.

Lead monitoring was discontinued in 2017 following many years of consistently low lead measurements.

While NO_2 concentrations remain well below the NAAQS, NO_2 as a precursor to ozone remains a concern within the region. Therefore, the regulatory NO_2 monitors remain necessary.

Table 23: Maximum Concentrations Summary for CO, NO_2, SO_2, PM_{10} and Pb

Year	CO 2nd Max 1-hr	CO 2nd Max 8-hr	NO_2 98th Percentile 1-hr	NO_2 Annual Mean	SO_2 99th Percentile 1-hr	PM_{10} 2nd Max 24-hr	Pb * 3-month rolling avg
2024	1.9	1.3	50	14	6	42	
2023	1.7	1.4	48	15	5	174**	
2022	1.8	1.5	56	14	7	47	
2021	1.6	1.4	54	14	6		
2020	2	1.8	50	13	5		
2019	2.2	1.7	52	13	17	2.2	
Standard	**35 ppm**	**9 ppm**	**100 ppb**	**53 ppb**	**75 ppb**	**150 µg/m^3**	**0.15 µg/m^3**

*Pb monitoring in Philadelphia was discontinued in 2017 due to consistent low levels of Lead.
** High PM_{10} maximum concentration was due to widespread wildfire smoke in the region

MONITORING EQUIPMENT ASSESSMENT

An important and often overlooked component of a network assessment is the evaluation of the condition and cost of monitoring equipment as well as any indirect equipment needed to support the air monitoring network.

Tables 24 - 25 inventory the types, conditions, and cost for air monitoring, analysis, and indirect equipment. In the 2020 network assessment, AMS stated the need to replace monitoring and analysis equipment. From 2020 – 2025, some monitoring equipment has been replaced to ensure accurate and reliable data. Additionally, several new analysis machines have been replaced at the AMS lab including a Gas Chromatography/Mass Spectroscopy (GC/MS) and a High-Performance Liquid Chromatography (HPLC). AMS will continue replacing and upgrading equipment as necessary over the next five years.

Table 24: Air Monitoring Equipment Inventory

Station: MON - AQS Site 421010076								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
Weather Transmitter	Vaisala	WXT520		Mar-25	0	5	$3,000	NO
Environmental Shelter	ShelterOne		652342	Jan-15	10	20	$25,000	NO
Calibrator	Teledyne - API	700E	684418	Jan-18	7	10	$12,000	NO
Zero Air Generator	Teledyne - API	701H	728827	Jan-22	3	10	$7,800	NO
PM 2.5	Teledyne - API	T640	728830	Jan-22	3	5	$24,000	NO
8872 Datalogger	Agilaire	8872		Jan-21	4	5	$6,000	NO
CO	Teledyne - API	T300	674548	Oct-16	9	5	$13,000	YES
NOx	Teledyne - API	T200	688522	Feb-18	7	7	$13,000	NO
TSP*	General Metal Works	N/A	607286	Feb-87	38	15	$4,000	YES
TSP*	General Metal Works	N/A	607287	Feb-87	38	15	$4,000	YES
Cellular Modem Switch	Juniper			Jan-23	2	5	$500	NO
Utrafine	Teledyne - API	M651	677004	Dec-15	10	5	$25,000	YES
Station: RIT - AQS Site 421010055								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
TSP*	General Metal Works		558360	Feb-90	35	15	$4,000	NO
Canister Sampler	Tisch	T123	595977	Jul-08	17	5	$12,000	YES
Carbonyl Label Printer	ATEC		629602	Jan-15	10	5		YES
8872 datalogger	Agilaire	8872	692854	Jan-19	6	5	$6,500	YES
Continuous PM 2.5	Teledyne- API	T640	742776	Jan-24	1	5	$27,700	NO
Calibrator	Teledyne- API	700E	652422	Nov-14	11	10	$16,000	YES
Zero Air Generator	Teledyne - API	701H	684419	Jan-18	7	10	$8,000	NO

SO_2	Teledyne - API	T100	750780	Jan-14	1	5		NO
Carbonyl	ATEC	2200	688524	Jun-18	7	7	$17,000	YES
Speciated PM 2.5	URG	3000N	620589	Jul-12	13	5	$22,000	YES
Environmental Shelter	ShelterOne					20		NO
Cellular Modem	Juniper			Jan-23	2	5	$500	NO
OZONE GENERATOR W/ OPTICAL FEEDBACK	Teledyne- API		652423	Nov-14	11	10	$2,500	YES
Sequential Particulate Speciation	URG		742292			5		
Sequential Particulate Speciation	URG	3000N Module C						
Sequential Particulate Speciation	URG	3000N Module Controller						
Station: NEA - AQS Site 421010024								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
Environmental Shelter	ShelterOne		511945			20		NO
Zero Air Generator	Teledyne - API	701H	653281	Jul-13	12	10	$6,000	YES
Ozone-D	Teledyne - API	T400	674549	Jan-15	10	5	$13,000	YES
8872 Datalogger	Agilaire	8872	692853	Feb-19	6	5	$6,000	YES
Ozone Calibrator	Teledyne - API	T703	705470	Jun-19	6	10	$16,000	NO
Cellular Modem	Juniper			Jan-23	2	5	$500	NO
Station: SWA - AQS Site 421010063								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
Canister Sampler	Tisch	T123	600114	Apr-09	16	5	$12,000	YES
Toxic Air Sampler/Carbonyl	ATEC	2200	710854	Jan-20	5	7	$11,000	NO
Carbonyl Label Printer	ATEC		646009	Jun-14	11	5	$500	YES
Environmental Shelter	ShelterOne					20		NO

Hygro-Thermometer Clock	Extech	445702		Sep-19	6	1		YES
Station: ROX - AQS Site 421010014								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
Toxic Air Sampler/Carbonyl	ATEC	2200	646007	Mar-14	11	5	$17,000	YES
Carbonyl Label Printer	ATEC		646010	Mar-14	11	5		NO
Hygro-Thermometer Clock	Extech	445702		Sep-19	6	1		YES
ATEC MODEL 2200-1 AIR SAMPLER		2200	719215	Jan-21	4	7	$11,000	NO
SHELTER 6'W x 6' x 8' MODEL LS06068			736254	Jan-23	2	20	$18,000	NO
SHELTER 6'W x 6' x 8' MODEL LS06068			736255	Jan-23	2	20	$18,000	NO
AIR CONDITIONER	FRIEDRICH	230/208V, 8.9K/10.7K HEAT	736784	Jan-23	2	5	$3,000	NO
Station: NEW - AQS Site 421010048								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
FRM - PM 2.5	Thermo	2025	576073	Jul-05	20	5	$25,000	YES
Canister	TISCH	T123	595981	Apr-08	17	5	$12,000	YES
FRM - PM 2.5	Thermo	2025	600413	May-09	16	5	$25,000	YES
Speciated PM 2.5	Met One	SASS	604236	May-10	15	5	$13,500	NO
TSP*	TISCH	TE-5005	607288	Dec-09	16	15	$4,000	NO
8872 Datalogger	Agilaire	8832	619761	Feb-12	13	5	$6,000	YES
Carbonyl Label Printer	ATEC		627465	Jul-13	12	5		NO
Continuous PM 2.5/BAM 1020	Met One	1020	635640	Jul-13	12	5	$22,000	NO
Weather Transmitter	Vaisala	WXT520	657262	Jan-16	9	5	$3,000	NO
Toxic Air Sampler/Carbonyl	ATEC	8000-3	673589	Dec-16	9	7	$17,000	YES

Ceilometer	Vaisala	CL51	680970	Jul-18	7	5	$25,000	NO
True NO2	Teledyne - API	T500U	684282	Feb-18	7	5	$25,000	NO
8872 Datalogger	Agilaire	8872	686257	Feb-18	7	5	$6,000	YES
Weather Tower Support			686262	Jan-18	7	20		NO
FRM - PM 2.5	Thermo	2025i	691151	Aug-18	7	5	$25,000	NO
Calibrator	Teledyne - API	T700	692765	Feb-19	6	10	$16,000	NO
AutoGC	CAS	GCCPU866	694304	Mar-19	6		$150,000	NO
UV Radiation	Eppley		695036	Mar-19	6	5		NO
NOy	Teledyne - API	T200U	704189	Feb-19	6	5	$16,000	NO
Ozone	Teledyne - API	T400	705467	Feb-19	6	5	$13,000	NO
Ozone Calibrator	Teledyne - API	T703	705469	Feb-19	6	10	$13,000	NO
CO	Teledyne - API	T300U	706583	Jan-20	5	7		NO
Environmental Shelter	ShelterOne			Jan-20	5	20		NO
Environmental Trailer	ShelterOne			Jan-20	5	20		NO
Carbonyl Label Printer	ATEC			Jan-20	5	5		NO
Rain Gauge	Met One	375D		Jul-19	6	5		NO
SO2 Gas		D574322		May-18	7			NO
CO Gas		CLM-007214		May-17	8			NO
NO Gas		FF9460		Jul-19	6			NO
ZERO AIR MODULE	Teledyne - API	T701H	706890	Jan-20	5	10	$7,800	NO
Particle Sensor	Teledyne - API	T640	710149	Jan-20	5	5	$22,000	NO
SOLAR RADIATION SENSOR W/1446 MOUNT			722698	Jan-21	4	3	$2,300	YES
ZERO AIR MODULE	Teledyne - API	T701	728828	Jan-22	3	10	$8,000	NO
CARBON SAMPLER, URG 3000N			732293	Jan-23	2	5	$16,000	NO
AIR CONDITIONER	FRIEDRICH	230/208V, 8.9K/10.7K HEAT	736783	Jan-23	2	5	$3,000	NO

UV FLUORESCENCE SO2 ANALYZER	Teledyne - API	T100	748952	Jan-22	3	7	$14,000	NO
Calibrator Assembly	Teledyne - API	T700	656899	Jan-15	10	10	$30,000	NO
Juniper Switch			673840	Jan-17	8	5	$8,000	NO
2 EIGHT PORT AUTOMATED CARBONYL SAMPLER	ATEC	Model 8000	688525	Jan-18	7	7	$15,000	NO
VSCC INLET			691152	Jan-18	7	5	$2,700	NO
PM 2.5	Clarity			Jan-25	0	5		NO
Station: FAB - AQS Site 421010057								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
8872 Datalogger	Agilaire	8872	710856	Jan-20	5	5	$6,000	NO
Continuous PM 2.5	Teledyne	T640	710146	Jan-20	5	5	$22,000	NO
Cellular Modem	Juniper			Jan-23	2	5	$500	NO
Shelter	Shelter One	BX902B				20		NO
Air Conditioner	GE Appliances	AHTC05AAQ1				5		NO
Station: TOR - AQS Site 421010075								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
CO	Teledyne - API	T300	630801	Oct-13	12	7	$13,000	YES
Environmental Shelter	ShelterOne		632294			20		NO
Zero Air Generator	Teledyne - API	T701H	633892	Mar-13	12	10	$6,000	NO
8872 Datalogger	Agilaire	8872	710855	Jan-20	5	5	$6,500	NO
Continuous PM 2.5	Teledyne- API	T640	748951	Jan-22	3	5	$24,000	NO
Weather Transmitter	Vaisala	WXT520	648806	Jan-14	11	5	$3,000	YES
NOx	Teledyne - API	T200	653520	Sep-13	12	7	$13,000	YES
Calibrator	Teledyne - API	T700	684495	Jan-18	7	10	$24,800	NO
CO Gas	Teledyne - API	T300	630801					
Cellular Modem	Juniper			Jan-23	2	5	$500	NO

Station: LAB - AQS Site 421010004								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
Environmental Shelter	ShelterOne		627747	Jan-13	12	20		NO
8872 Datalogger	Agilaire	8872		Jan-23	2	5	$6,000	NO
Ozone	Teledyne - API	T400	705468	Jan-20	5	5	$8,800	NO
Zero Air Generator	Teledyne - API	701H	663412	Apr-15	10	10	$6,000	NO
Ozone Calibrator	Teledyne - API	T703	684449	Nov-17	8	10	$16,000	NO
Cellular Modem	Juniper			Jan-23		5	$500	NO
Station: VGR								
Instrument	**Vendor**	**Model**	**CP#**	**Year Purchased**	**Age (years)**	**Average Life Span**	**Estimated Cost**	**Replacement Recommended**
Ozone	2B Technologies	106L	757355	Jan-25	0	5	$5,300	NO
Environmental Bench				Jan-15	10			NO
PM 2.5	Thermoscientific	PDR1500		Jan-15	10		$4,000	NO
Weather Transmitter			744520	Jan-24	1		$10,000	NO
Cellular Modem	Sierra Wireless	Raven XE EVDO		Aug-12	13	5		YES

Table 25: Laboratory Analysis, Calibration, Chemistry, and Support Equipment

Lab Equipment				
Tag #	**Item Description**	**PO #**	**Item Value**	**Year Purchased**
448781	METER AIR VELOCITY	V1-32435	$1,045	2001
532742	PRESSURE INDICATOR, HANDHELD, DRUCK MODEL 705	POXX01110275	$949	2001
532743	PRESSURE INDICATOR, HANDHELD, DRUCK MODEL 705	POXX01110275	$949	2001
534456	PC, PENTIUM III OR AMD ATHLON 700 MHZ	POXX01115333	$703	2001
534462	PRINTER, HEWLETT PACKARD LASERJET 4050N.	POXX01115333	$1,285	2001
535133	CALIBRATOR, DELTA CAL VOLUMETRIC FLOW CALIBRATION/AUDIT DEVICE, BAROMETRIC PRESSURE, AMBIENT AND FILTER TEMP	POXX01116453	$1,595	2001
556514	CHROMATOGRAPH, HIGH PRESSURE LIQUID	POXX03116199	$40,361	2003
556515	CHROMATOGRAPH, HIGH PRESSURE LIQUID	POXX03116199	$40,361	2003
577188	PRINTER, HP	POXX06106546	$1,177	2006
577189	PRINTER, HP	POXX06106546	$1,177	2006
596976	PC, TABLET	POXX08117772	$2,700	2008
600114	SAMPLER, SINGLE CHANNEL CANISTER	POXX09114178	$6,100	2009
603523	SAMPLER, SEQUENTIAL PARTICULATE SPECIATION	POXX10108382	$10,713	2010
603685	GENERATOR, TELEDYNE	POXX10109421	$5,676	2010
604229	CALIBRATOR, DEFINER 220	POXX10115424	$2,000	2010
604230	CALIBRATOR, DEFINER 220	POXX10115424	$2,000	2010
604232	CALIBRATOR, DEFINER 220	POXX10115424	$2,000	2010
604233	CALIBRATOR, DEFINER 220	POXX10115424	$2,000	2010
604234	CALIBRATOR, DEFINER 220	POXX10115424	$2,000	2010
604235	CALIBRATOR, DEFINER 220	POXX10115424	$2,000	2010
609273	PC, DELL OPTIPLEX 780	POXX11105447	$823	2011
611434	CHROMATOGRAPH, GAS	POXX11108420	$23,861	2011
611435	CHROMATOGRAPH, GAS	POXX11108420	$5,424	2011
611436	CHROMATOGRAPH, GAS	POXX11108420	$7,455	2011
620416	SAMPLER, SEQUENTIAL PARTICULATE SPECIATION	POXX12105456	$11,365	2012
624218	ANALYZER, CHEMILUMINESCENCE, NO/NO2/NOX	POXX12115055	$10,480	2012
627998	PHOTOCOPIER, XEROX, WC5765 VOLUME BAND VII	POXX13105935	$4,670	2013

633587	PC, DELL, MINITOWER OPTIPLEX 7010	POXX13111398	$614	2013
633590	PC, DELL, MINITOWER OPTIPLEX 7010	POXX13111398	$614	2013
633591	PC, DELL, MINITOWER OPTIPLEX 7010	POXX13111398	$614	2013
635432	DATA LOGGER, BASE MODEL 8872 B	POXX13113175	$5,290	2013
635433	DATA LOGGER, BASE MODEL 8872 B	POXX13113910	$5,290	2013
635436	DATA LOGGER, BASE MODEL 8872 B	POXX13114132	$5,290	2013
644336	MONITOR, AIR QUALITY, EVM-7 ADVANCED PARTICULATE	POXX14108198	$6,870	2014
646008	SAMPLER, CARBONYL, TWO CHANNEL ATEC 2200C	POXX14111710	$12,695	2014
646138	TRANSMITTER, WEATHER	POXX14112265	$2,778	2014
649650	TABLET, DELL, VENUE 11 PRO	POXX14120393	$957	2014
650716	SPECTROMETER, EPSILON, 3X ENERGY DISPERSIVE X-RAY FLUORSCENCE	POXX15102135	$60,000	2015
652338	AIR SYSTEM, HIGH PERFORMANCE ZERO AIR T701H	POXX15105277	$6,715	2015
653277	CALIBRATOR, DYNAMIC CALIBRATOR T700	POXX15106326	$9,945	2015
653278	MIXING CHAMBER	POXX15106326	$2,163	2015
653279	PHOTOMETER MODULE, U.V.	POXX15106326	$2,729	2015
653280	THIRD MASS FLOW CONTROLLER	POXX15106326	$2,825	2015
653512	Deuterium Source Lamp	POXX15103547	$1,351	2015
653514	Deuterium Source Lamp	POXX15103547	$1,351	2015
653515	Deuterium Source Lamp	POXX15103547	$1,351	2015
654637	PCs, Optiplex 7020MT BTX	POXX15111207	$799	2015
654642	PCs, Optiplex 7020MT BTX	POXX15111207	$799	2015
654643	PCs, Optiplex 7020MT BTX	POXX15111207	$799	2015
654649	PCs, Optiplex 7020MT BTX	POXX15111207	$799	2015
654650	PCs, Optiplex 7020MT BTX	POXX15111207	$799	2015
655432	Analyzer, Teledyne Model T300U	POXX15107343	$11,805	2015
656898	Dishwasher	POXX15116075	$580	2015
657250	T700 Calibrator Assembly	POXX15112852	$21,633	2015
657251	T701H - Zero Air Module	POXX15112852	$7,800	2015
657680	7200 Air Tox/Soil Gas Bundle -RETAG	POXX15114204	$31,972	2015
661856	TV, 60" LED Vizio E60-c3	POXX16111448	$1,100	2016
662127	SHREDDER, SEM MODEL 2226P/2 CROSS CUT	POXX15117499	$935	2015
663634	REFRIGERATOR, AMANA, 18 CF	POXX16110495	$679	2016
672965	ZERO AIR MODULE, MOD. 751, W SCRUBBER, CAL GAS 0-5	POXX16116189	$4,250	2016

672966	ZERO AIR MODULE, MOD. 751H, CAL GAS 0-10	POXX16116189	$7,650	2016
674553	Environmental Control Module, Vaisala HMT33	POXX17104773	$1,648	2017
674999	Carbonyl Sampler, 2 Channel, Automated	POXX16120895	$12,415	2016
681266	Diluter, SL2 Precision Static	POXX17118347	$0	2017
681267	Oven, 6L Canister	POXX17118339	$3,476	2017
681432	Oven, 6L Canister	POXX17118339	$3,476	2017
684966	Optical Transmissometer	POXX18107501	$8,900	2018
684968	Koehler K21410 Saybolt Viscosity Bath	POXX18118184	$7,265	2018
687039	Water Sytem, Reverse Osmosis	POXX18118598	$1,092	2018
687607	AIR COMPRESSOR, SPEEDAIRE 60 GALLON	POXX18119734	$870	2018
687678	TABLE, WORK WITH LOWER SHELF 60L X 30W X 36H	POXX18121307	$1,677	2018
687777	Table, Rolling, for workstation	POXX18118779	$785	2018
691990	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691991	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691992	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691993	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691994	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691995	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691996	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691997	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
691998	AIR SAMPLER, PORTABLE, AMBIENT	POXX19103967	$13,980	2019
692405	CALIBRATOR, AIR FLOW, BGI TETRACAL	POXX19106323	$2,600	2019
692406	HARVARD IMPACTOR, FOR AIR SAMPLER	POXX19106323	$1,240	2019
692425	HARVARD IMPACTOR, FOR AIR SAMPLER	POXX19106323	$1,240	2019
692426	HARVARD IMPACTOR	POXX18120895	$1,118	2018
692427	HARVARD IMPACTOR	POXX18120895	$1,118	2018
692428	HARVARD IMPACTOR	POXX18120895	$1,118	2018
692429	HARVARD IMPACTOR	POXX18120895	$1,118	2018
692430	HARVARD IMPACTOR	POXX18120895	$1,118	2018
692431	HARVARD IMPACTOR	POXX18120895	$1,118	2018
693071	PUMP, SKC MODEL 224-PCXR4-QC	POXX19111423	$1,350	2019
695344	TITRATOR, METTLER TOLEDO V20S COMPACT VOLUMETRIC KF	POXX19119714	$0	2019
695345	FLASK SHAKER, FISHERBRAND	POXX19119714	$0	2019
696013	ANALYZER, OPTICAL, PM, MODEL T640	POXX19117060	$21,500	2019

704190	CALIBRATOR, MODEL T750U PORTABLE DYNAMIC DIMUTION	POXX19122095	$21,850	2019
704827	18 CU FT TOP FREEZER REFRIGERATOR	POXX20104509	$890	2020
704828	18 CU FT TOP FREEZER REFRIGERATOR	POXX20104509	$890	2020
704829	18 CU FT TOP FREEZER REFRIGERATOR	POXX20104509	$890	2020
705940	MODEL T640 OPTICAL PM ANALYZER	POXX20107908	$21,620	2020
706891	T701H ZERO AIR MODULE	POXX20113989	$7,740	2020
706900	SL2 16P DIGITAL AUTOSAMPLER	POXX20113862	$15,031	2020
710145	NO2 Analyzer N500	POXX20116663	$16,050	2020
710146	Particle Sensor, T640	POXX20119353	$21,620	2020
710760	Sound Level Meter	POXX20111827	$0	2020
710761	Sound Level Meter	POXX20111827	$0	2020
710838	Flowmeter	POXX20117604	$1,546	2020
710839	Flowmeter	POXX20117604	$1,546	2020
710840	Flowmeter	POXX20117604	$1,546	2020
710853	ATEC MODEL 2200-1P PRESURIZED SINGLE CHANNEL CANISTER SAMPLER	POXX20120070	$10,795	2020
710856	Data Logger, Agilaire Model 8872	POXX20119425	$6,450	2020
719082	Analytical Balance, Mettler Toledo XSR104	POXX21104406	$6,540	2021
719083	Analytical Balance, Mettler Toledo XSR1204	POXX21104406	$7,610	2021
719084	Analytical Balance, Mettler Toledo XSR1204	POXX21104406	$7,610	2021
719085	Analytical Balance, Mettler Toledo XPR205	POXX21104406	$16,823	2021
719098	ANALYZER, T640 OPTICAL PM	POXX21104656	$21,620	2021
719216	ATEC MODEL 2200-1 AIR SAMPLER	POXX21104562	$10,795	2021
719240	REFRIGERATOR, INDUSTRIAL T-49-HC	POXX21108154	$4,290	2021
719241	REFRIGERATOR, INDUSTRIAL T-49-HC	POXX21108154	$4,290	2021
719499	EX2300 48-PORT POE+ SWITCH	POXX23107962	$2,434	2023
719500	EX2300 48-PORT POE+ SWITCH	POXX23107962	$2,434	2023
719563	SRX320 SERVICES GATEWAY	POXX23107962	$885	2023
719739	MICROBALANCE METTLER TOLEDO XPR MODEL XPR6UD5	POXX21110401	$33,660	2021
722316	SRX320 ROUTERS	POXX21113150	$699	2021
722317	SRX320 ROUTERS	POXX21113150	$699	2021
722318	SRX320 ROUTERS	POXX21113150	$699	2021
722319	SRX320 ROUTERS	POXX21113150	$699	2021
722320	SRX320 ROUTERS	POXX21113150	$699	2021

722321	SRX320 ROUTERS	POXX21113150	$699	2021
722322	SRX320 ROUTERS	POXX21113150	$699	2021
722323	SRX320 ROUTERS	POXX21113150	$699	2021
722324	SRX320 ROUTERS	POXX21113150	$699	2021
722699	DEFIBRILLAOTR, LIFEPAKPAK CR PLUS AED	POXX21116887	$1,964	2021
722913	PC, DELL OPTPLEX 5080 SFF SCTO	POXX21113358	$900	2021
722914	PC, DELL OPTPLEX 5080 SFF SCTO	POXX21113358	$900	2021
722915	PC, DELL OPTPLEX 5080 SFF SCTO	POXX21113358	$900	2021
728829	T640 OPTICAL PM ANALYZER	POXX22103308	$23,925	2022
732286	ANEMOMETERS	POXX23106865	$1,281	2023
732288	PRESSURE INDICATOR, DRUCK MODEL DPI 705E	POXX23104907	$1,075	2023
732289	PRESSURE INDICATOR, DRUCK MODEL DPI 705E	POXX23104907	$1,075	2023
732290	PRESSURE INDICATOR, DRUCK MODEL DPI 705E	POXX23104907	$1,075	2023
732292	CARBON SAMPLER, URG 3000N	POXX23102592	$16,013	2023
735937	TEMPERATURE CALIBRATOR, HANDHELD, TEGAM 940A	POXX23111080	$1,106	2023
736015	TEMPERATURE CALIBRATOR, HANDHELD, TEGAM 940A	POXX23111080	$1,106	2023
736016	TEMPERATURE CALIBRATOR, HANDHELD, TEGAM 940A	POXX23111080	$1,106	2023
736057	CARBONYL SAMPLER 8-PORT MODEL 8000	POXX23114352	$17,940	2023
736058	CARBONYL SAMPLER 8-PORT MODEL 8000	POXX23114352	$17,940	2023
736184	PRESSURIZED SINGLE CHANNEL CANNISTER SAMPLER - ATEC MODEL 2200-1	POXX23114344	$0	2023
736256	POWER DISTRIBUTION CENTER BEFE 0606	POXX23114771	$1,256	2023
736257	POWER DISTRIBUTION CENTER BEFE 0606	POXX23114771	$1,256	2023
736258	ROOF SYSTEM INCLUDING RAILS OSHA COMPLIANT	POXX23114771	$4,432	2023
736259	ROOF SYSTEM INCLUDING RAILS OSHA COMPLIANT	POXX23114771	$4,432	2023
736260	LADDER-STANDARD DUTY-OSHA ENGINEERED	POXX23114771	$984	2023
736261	LADDER-STANDARD DUTY-OSHA ENGINEERED	POXX23114771	$984	2023
736278	VELOMETER, TSI MODEL 9545	POXX23114340	$1,430	2023
737804	CANNISTER CLEANING MODULE 01-3100D SL2-3100	POXX23115905	$17,161	2023
737905	REFRIGERATOR FREEZER, CONVERTIBLE UPRIGHT WHITE, GARAGE READY 21 CUBIC FOOT	POXX23117648	$1,021	2023
737906	FREEZER,FROST FREE, UPRIGHT WHITE, GARAGE READY 21.3 CUBIC FOOT	POXX23117648	$1,019	2023
742595	ATEC Model 2200-1 Pressurized Single Channel Cannister Sampler	POXX23114344	$11,495	2023

742596	ATEC Model 2200-1 Pressurized Single Channel Cannister Sampler	POXX23114344	$11,495	2023
742762	Agilaire Model 8872 Data Loggers	POXX23110494	$8,250	2023
742763	Agilaire Model 8872 Data Loggers	POXX23110494	$8,250	2023
742764	Agilaire Model 8872 Data Loggers	POXX23110494	$8,250	2023
742765	Agilaire Model 8872 Data Loggers	POXX23110494	$8,250	2023
744143	Model T200 NO/NO2/Nox Analyzer	POXX23117470	$0	2023
744144	Model T200 NO/NO2/Nox Analyzer	POXX23117470	$0	2023
744145	Model 751H High Performance Zero Air System	POXX23117470	$0	2023
744146	Model 751H High Performance Zero Air System	POXX23117470	$0	2023
744170	CUNY MODEL #PAAS 210 PORTABLE AMBIENT AIR SAMPLER	POXX22107381	$13,980	2022
744171	CUNY MODEL #PAAS 210 PORTABLE AMBIENT AIR SAMPLER	POXX22107381	$13,980	2022
744172	CUNY MODEL #PAAS 210 PORTABLE AMBIENT AIR SAMPLER	POXX22107381	$13,980	2022
744173	CUNY MODEL #PAAS 210 PORTABLE AMBIENT AIR SAMPLER	POXX22107381	$13,980	2022
744174	CUNY MODEL #PAAS 210 PORTABLE AMBIENT AIR SAMPLER	POXX22107381	$13,980	2022
744175	CUNY MODEL #PAAS 210 PORTABLE AMBIENT AIR SAMPLER	POXX22107381	$13,980	2022
744187	BGI Tetracal Flow Meters 1.2-30 LPM	POXX23118062	$3,985	2023
744188	BGI Tetracal Flow Meters 1.2-30 LPM	POXX23118062	$3,985	2023
744189	Model TE475-2 Digital Manometer	POXX23118062	$1,210	2023
744190	Model TE475-2 Digital Manometer	POXX23118062	$1,210	2023
744515	Model T100U Ultra Sensitive UV Flourescent SO2 analyzer	POXX24104385	$18,000	2024
744516	Model T200U Ultra Sensitive CheiluminescenceNO/NO2/NOX analyzer	POXX24104385	$23,800	2024
744517	Model T400 UV absorption O3 analyzer	POXX24104385	$11,000	2024
744519	Model T700 Dynamic dilution calibrator	POXX24104385	$18,633	2024
744521	Model T640 PM Mass Monitor	POXX24104385	$27,651	2024
744532	Portable Ambirnt Air Sampler (Retag 729497)	POXX21109914	$13,980	2021
744533	Portable Ambirnt Air Sampler (Retag 729498)	POXX21109914	$13,980	2021
744534	Portable Ambirnt Air Sampler (retag 729499)	POXX21109914	$13,980	2021
748953	NO/NO2/NOX ANALYZER T200U	POXX22119561	$18,150	2022
748954	UV ABSORPTION 03 ANALYZER T400	POXX22119561	$8,792	2022
748955	HIGH PERFORMANCE ZERO AIR SYSTEM T1701H	POXX22119561	$8,792	2022
749312	COMPUTER, MARKES INTERNATIONAL TD-GC-MS	PMHCC 2-16-21	$16,657	2002
749313	THERMO DISORPTION, MARKES INTERNATIONAL	PMHCC 2-16-21	$50,510	2002
749314	AGILENT- GC - MS (8890-5977)	PMHCC 2-16-21	$43,911	2002

749315	SORBENT TUBE CONDITIONER TC20	PMHCC 2-16-21	$10,381	2002
749316	UHPLC (2 INSTRUMENTS)	PMHCC 2-16-21	$21,083	2002
749317	UHPLC (2 INSTRUMENTS)	PMHCC 2-16-21	$21,083	2002
749318	ION CHROMATOGRAPHY	PMHCC 2-16-21	$27,573	2002
749319	EPSILON4	PMHCC 2-16-21	$81,287	2002
749321	AUTOSAMPLER	POXX22102327	$7,874	2022
749504	STORAGE SHED, UDDAN 8.5 FT X 11 FT	POXX23105638	$1,875	2023
750894	TELEDYNE MODEL T700U DYNAMIC DILUTION CALIBRATOR SN:907	POXX24115316	$31,380	2024
751459	PRE-ASSEMBLED DUSTTRAK ENVIRONMENTAL MONITOR.	POXX24113904	$7,476	2024
751460	PRE-ASSEMBLED DUSTTRAK ENVIRONMENTAL MONITOR.	POXX24113904	$7,476	2024
754470	COPIER, XEROX C8135H2	POXX24121434	$5,686	2024
754600	DUSTRAK ENVTL AC MAIN PWR SUPPLY PART# 854001-1	POXX24113904	$7,476	2024
754601	DUSTRAK ENVTL AC MAIN PWR SUPPLY PART# 854001-1	POXX24113904	$7,476	2024
754602	PM10 IMPACTOR PART#854020	POXX24113904	$2,263	2024
754603	PM10 IMPACTOR PART#854020	POXX24113904	$2,263	2024
754604	HEATED INLET CONDITIONER EDT PART#854041	POXX24113904	$0	2024
754605	HEATED INLET CONDITIONER EDT PART#854041	POXX24113904	$0	2024
756027	PORTABLE AIR CONDITIONER, EC ECOFLOW WAVE 2, WITH ADD N BATTERY	POXX24118332	$2,484	2024
756837	AGILENT 8890	POXX25106573	$18,020	2025
756838	AGILENT GCMS 5977 TURBO SYSTEM	POXX25106573	$15,176	2025
758982	MODEL T700U DYNAMIC DILUTION CALIBRATOR	POXX25107603	$32,790	2025
760355	PDR 1500 PERSONAL DATARAM	POXX25111293	$10,020	2025
760356	PDR 1500 PERSONAL DATARAM	POXX25111293	$10,020	2025
760398	AIR MASS WHISPER SERIES FLOWMETER	POXX25108505	$1,730	2025
760399	PORTABLE FLOW CALIBRATOR FOR PARTICULATE AIR SAMPLERS WITH BLUETOOTH	POXX25108505	$3,250	2025
760476	SUPER SASS SEQUENTIAL SPECIATION SAMPLER	POXX25107979	$0	2025
760645	SAMSUNG 17.5 CU FT FRENCH DOOR REFRIGERATOR WITH ICE MAKER	POXX25114002	$1,247	2025