

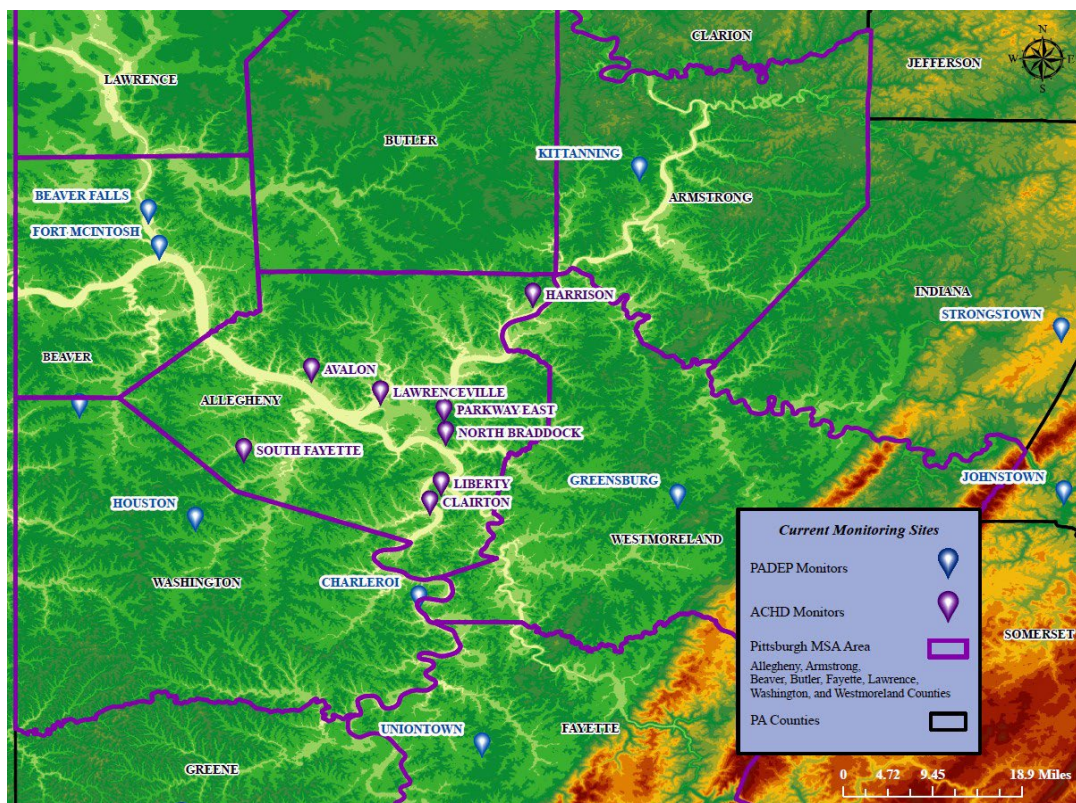
Appendix C-1 ALLEGHENY COUNTY AREA

PADEP reviewed the Pittsburgh Metropolitan Statistical Area (MSA) to determine its designation recommendations for the 2024 annual PM_{2.5} National Ambient Air Quality Standard (NAAQS). Based on the analysis below, PADEP recommends a nonattainment area limited to Allegheny County only and outlines the reason for recommending a nonattainment area identical to the area that EPA designated for the 2012 PM_{2.5} standard. (Previously with the 1997 and 2006 NAAQS, Allegheny County was divided into two portions: a partial-county Liberty-Clairton area was made up of five municipalities in the Monongahela River Valley; the remainder of the county was part of the Pittsburgh-Beaver Valley area, which included a large portion of the Pittsburgh MSA.)

Analysis of the Ambient PM_{2.5} Data – A Design Value Contribution Analysis

Based on EPA-certified 2023 PM_{2.5} design values (EPA AQS AMP480 Report), four monitors in the Pittsburgh MSA (which includes the eight Pennsylvania counties of Allegheny, Armstrong, Beaver, Butler, Fayette, Lawrence, Washington, and Westmoreland) are violating the 2024 PM_{2.5} annual standard of 9.0 µg/m³. The monitors and their design values are: Avalon (AQS ID# 42-003-0002) at 9.2 µg/m³ (in Allegheny County), Liberty (AQS ID# 42-003-0064) at 11.6 µg/m³ (in Allegheny County), North Braddock (AQS ID# 42-003-1301) at 10.0 µg/m³ (in Allegheny County), and Parkway East (AQS ID# 42-003-1376) at 9.5 µg/m³ (in Allegheny County). Figure C-1.1 is a map outlining the location of these monitors, along with monitors in attainment in the Pittsburgh MSA. Note: The Allegheny County Health Department (ACHD) operates the monitors within Allegheny County.

Figure C-1.1: Pittsburgh MSA PM_{2.5} Monitoring Map



PADEP has completed a design value contribution analysis for all the PM_{2.5} monitors in the Pittsburgh MSA with valid 2023 PM_{2.5} design values. The analysis attempts to determine the daily contribution of PM_{2.5} concentrations to the annual PM_{2.5} design value. EPA-certified daily PM_{2.5} measurements (EPA AQS AMP355 Report) were grouped into different PM_{2.5} concentration ranges. An analysis of each range's contribution was then conducted to determine which measurements are contributing to the monitor's design value. Dates of these measurements were then further analyzed to determine if there are specific meteorological conditions or sources that are adversely impacting the monitor's design value.

Results from the design value contribution analysis for the Pittsburgh MSA are summarized in Table C-1.1. Ultimately, the type of contribution a given monitor's daily value had on the 3-year design value (by comparing this value to 9.0 µg/m³) was determined. The daily value for each day a monitor measured PM_{2.5} levels was placed in one of the ten categories.

For example, on January 1, 2021, the Liberty monitor's 24-hour PM_{2.5} average was 6.1 µg/m³. Since this value falls in the 4.5-9.0 µg/m³ category in Table C-1.1, the calculated daily contribution to the design value was placed in this category. In the first quarter of 2021 (January 1 to March 31), the Liberty monitor recorded 90 measurements. PADEP determined that the January 1, 2021, contribution assessment to the 2023 design value was -0.002685 µg/m³. The -0.002685 µg/m³ was calculated by subtracting the standard of 9.0 µg/m³ from the average daily value of 6.1 µg/m³ and then dividing this by the number of measurements for the quarter (90) times 12 (there are a total of 12 quarters in a 3-year design value period). This type of analysis was completed for every day of measurements from January 1, 2021, through December 31, 2023. In Table C-1.1, the sum of the categorical breakdowns for the Liberty monitor equals 2.6273 µg/m³, which demonstrates that the design value is 2.6273 µg/m³ above the annual standard of 9.0 µg/m³.

Figures C-1.2.1 – C-1.2.25 show the design value contribution and category breakdown for the twelve monitors and summary.

PADEP'S DESIGNATION RECOMMENDATIONS FOR THE 2024 PRIMARY ANNUAL FINE PARTICULATE MATTER (PM_{2.5}) NATIONAL AMBIENT AIR QUALITY STANDARD

***Table C-1.1: Pittsburgh MSA
2023 PM_{2.5} Annual Design Value Contribution Analysis***

Site Name	Site ID	Owner	0 - 4.5	4.5 - 9.0	9.0 - 13.5	13.5 - 18.0	18.0 - 22.5	22.5 - 27.0	27.0 - 31.5	31.5 - 36.0	36.0 - 40.5	40.5 - 45.0	SUM
Monitors Attaining 2024 PM_{2.5} Standard													
Charleroi	421250005	PADEP	-0.7993	-1.1339	0.5072	0.6269	0.1879	0.2107	0.0404	0.0495	0.0557	0.3307	0.0757
Beaver Falls	420070014	PADEP	-0.9343	-1.0355	0.5608	0.5107	0.2841	0.1128	0.0922	0.0242	0.0573	0.2608	-0.0668
Lawrenceville	420030008	ACHD	-0.8803	-1.1624	0.4302	0.4795	0.2626	0.1672	0.0567	0.0689	0.0269	0.2712	-0.2794
Clairton	420033007	ACHD	-1.0901	-1.2130	0.4560	0.4906	0.3330	0.1001	0.0390	0.0242	0.0253	0.1879	-0.6470
Kittanning	420050001	PADEP	-1.0826	-1.3707	0.3896	0.4317	0.3422	0.1229	0.0710	0.0223	0.0612	0.2659	-0.7463
Harrison	420031008	ACHD	-1.2133	-1.1332	0.3513	0.4519	0.1177	0.1253	0.0000	0.0000	0.0784	0.2940	-0.9279
South Fayette	420030067	ACHD	-1.5362	-1.2389	0.3344	0.3360	0.0953	0.1251	0.0000	0.0000	0.0813	0.3032	-1.4999
Florence	421255001	PADEP	-1.5629	-1.3305	0.2446	0.3047	0.0924	0.0781	0.0821	0.0222	0.0000	0.3643	-1.7051
Monitors Not Attaining 2024 PM_{2.5} Standard													
Liberty	420030064	ACHD	-0.9962	-0.7290	0.4544	0.8490	0.9134	0.8270	0.4627	0.3251	0.1119	0.4089	2.6273
North Braddock	420031301	ACHD	-0.7558	-0.9183	0.5470	0.8151	0.5896	0.2743	0.0961	0.0221	0.0550	0.2382	0.9632
Parkway East	420031376	ACHD	-0.6529	-1.0976	0.5289	0.6072	0.4040	0.2266	0.0569	0.0453	0.0256	0.3586	0.5026
Avalon	420030002	ACHD	-0.6304	-1.1238	0.4758	0.6588	0.2798	0.1135	0.0594	0.0460	0.0269	0.3005	0.2065
Pittsburgh MSA Average			-1.0401	-1.1317	0.4212	0.5424	0.3430	0.2160	0.0924	0.0576	0.0493	0.2993	-0.1506

Figure C-1.2.1: Liberty PM_{2.5} Design Value Contribution (µg/m³)

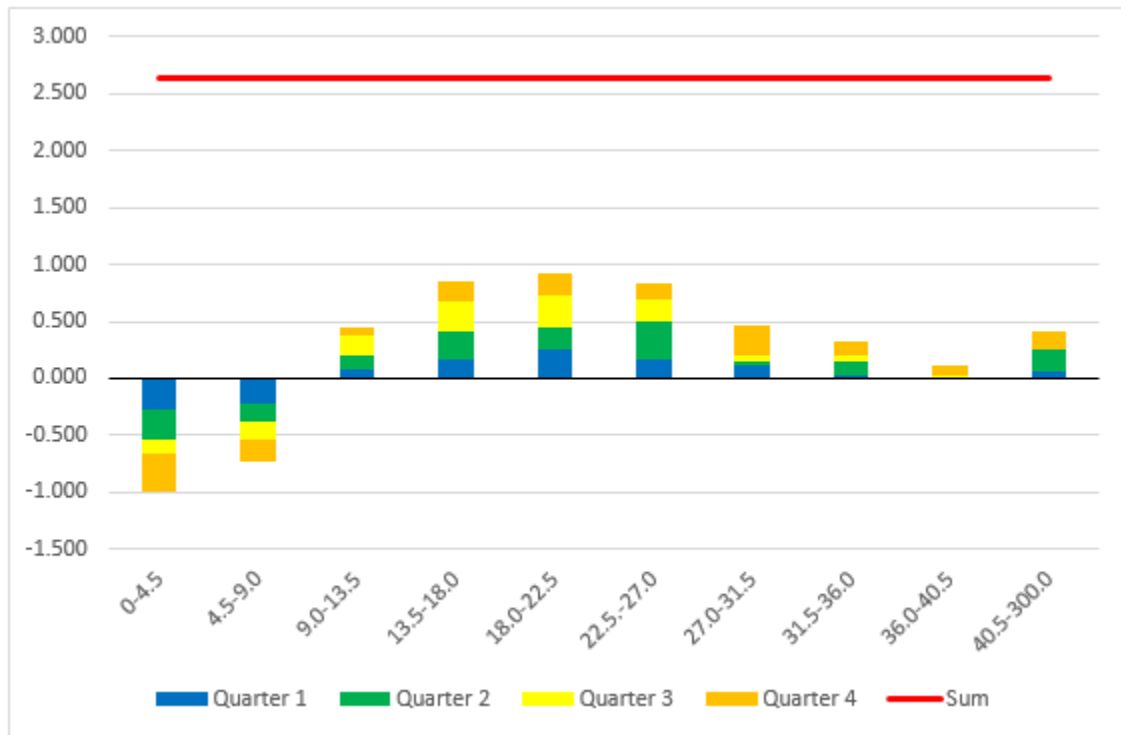


Figure C-1.2.2: Liberty PM_{2.5} Design Value Category Breakdown

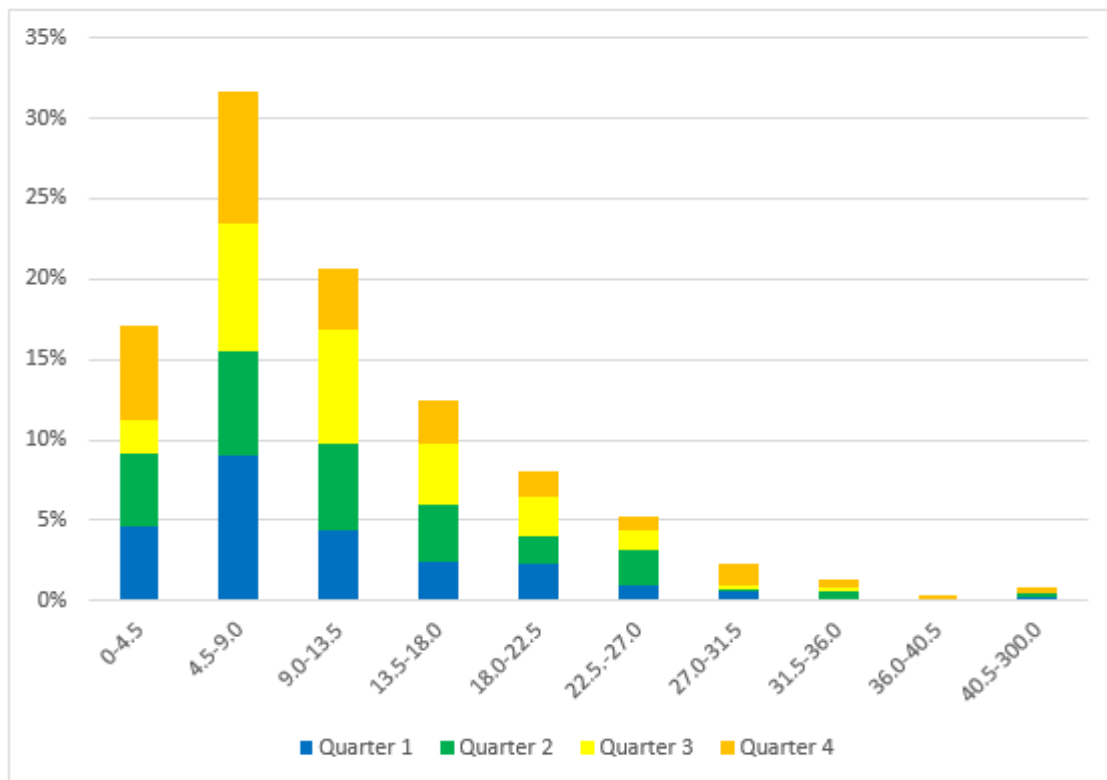


Figure C-1.2.3: North Braddock PM_{2.5} Design Value Contribution (µg/m³)

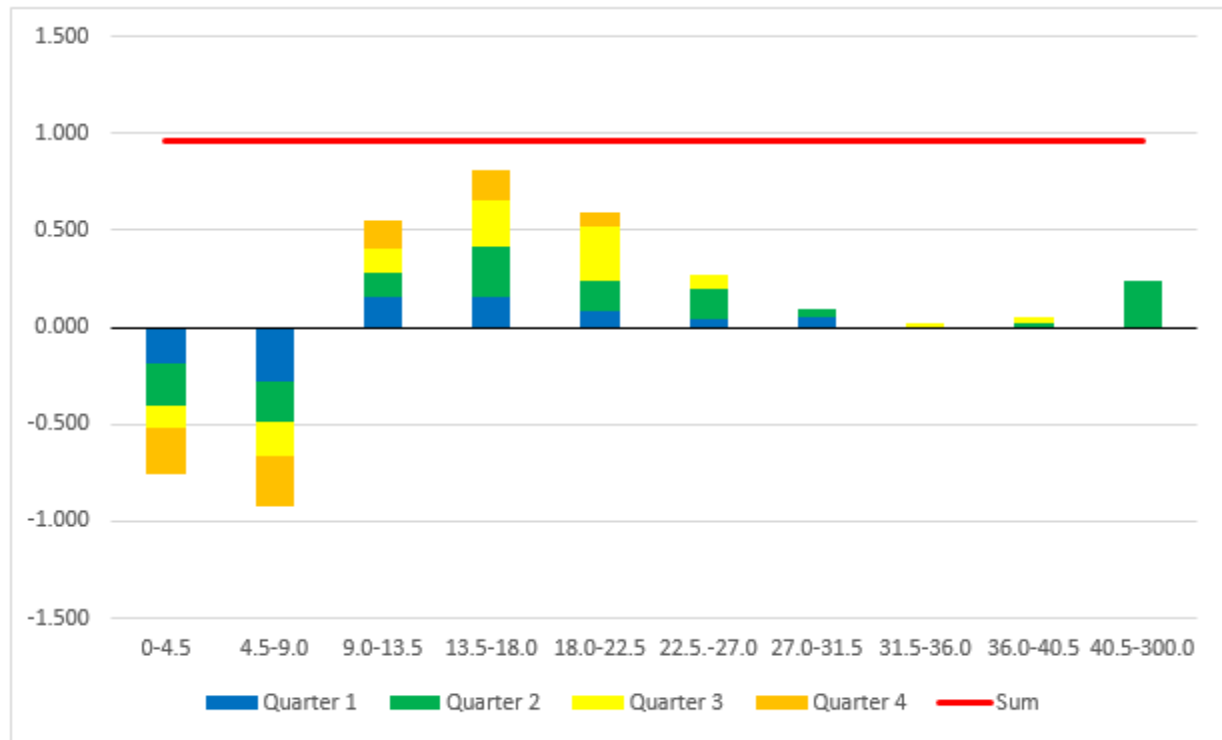


Figure C-1.2.4: North Braddock PM_{2.5} Design Value Category Breakdown

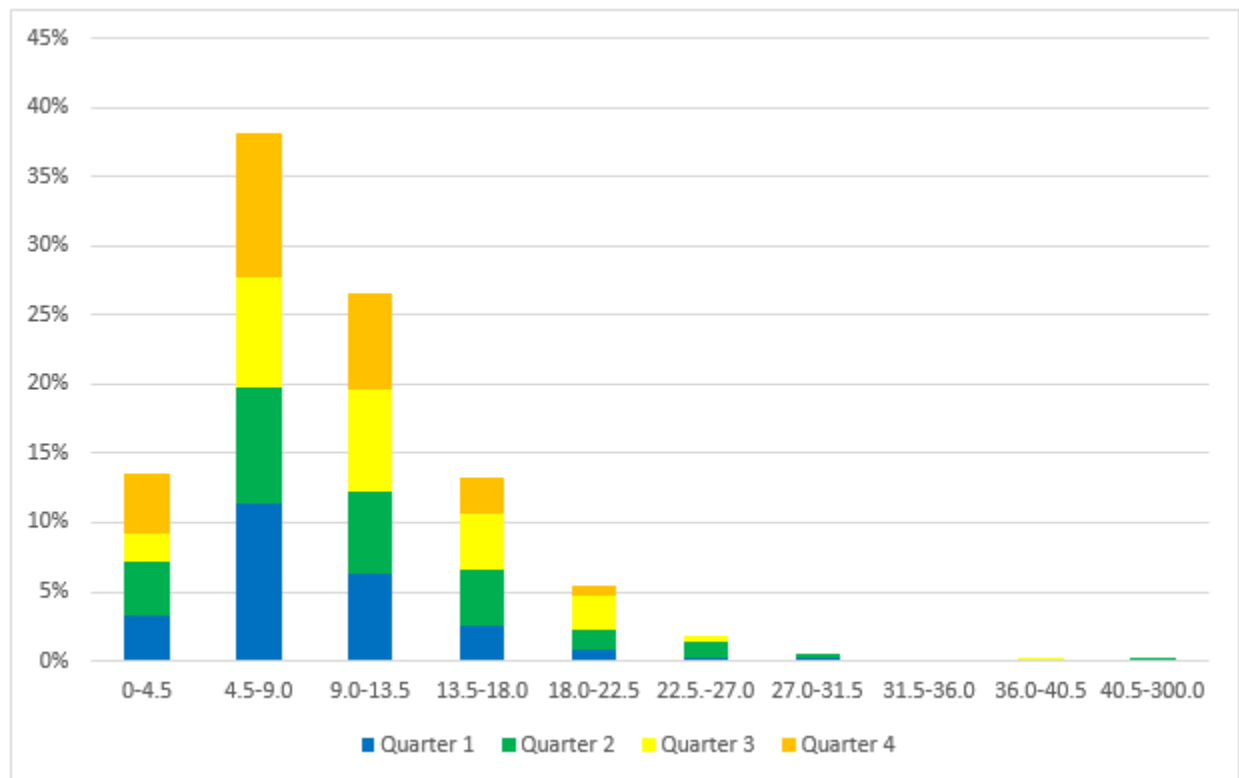


Figure C-1.2.5: Parkway East PM_{2.5} Design Value Contribution (µg/m³)

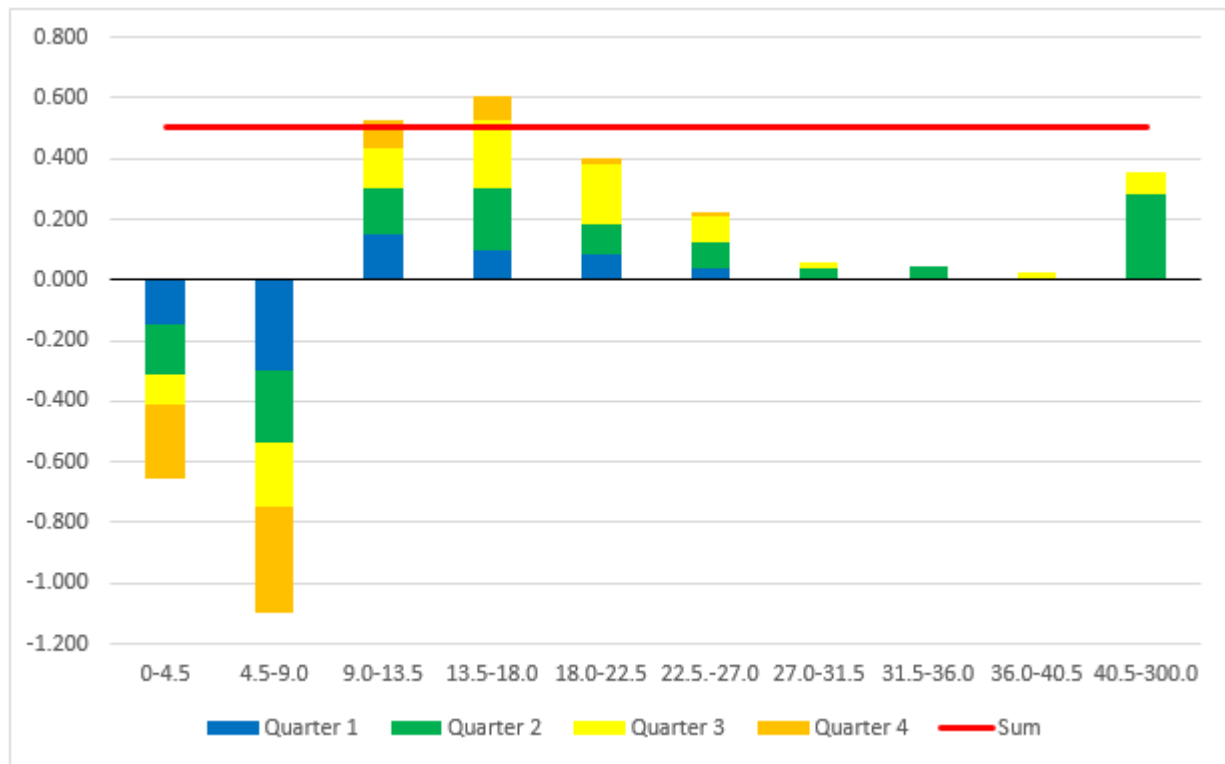


Figure C-1.2.6: Parkway East PM_{2.5} Design Value Category Breakdown

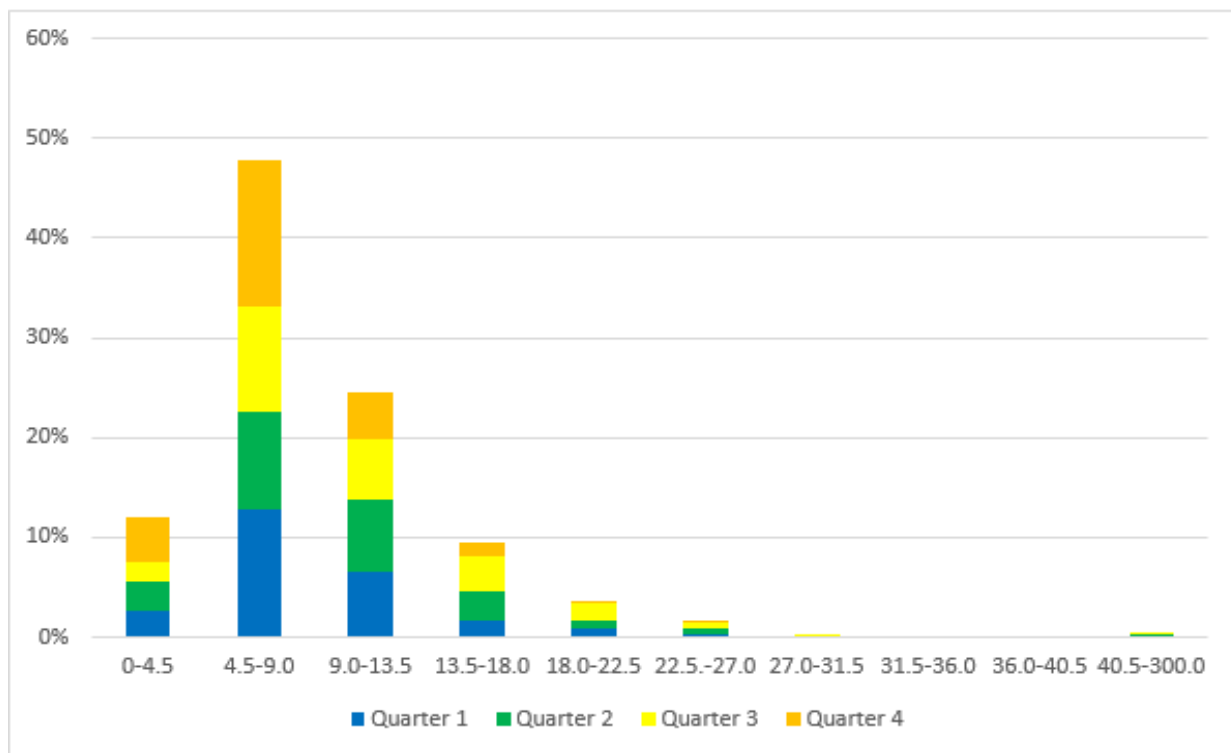


Figure C-1.2.7: Avalon PM_{2.5} Design Value Contribution (µg/m³)

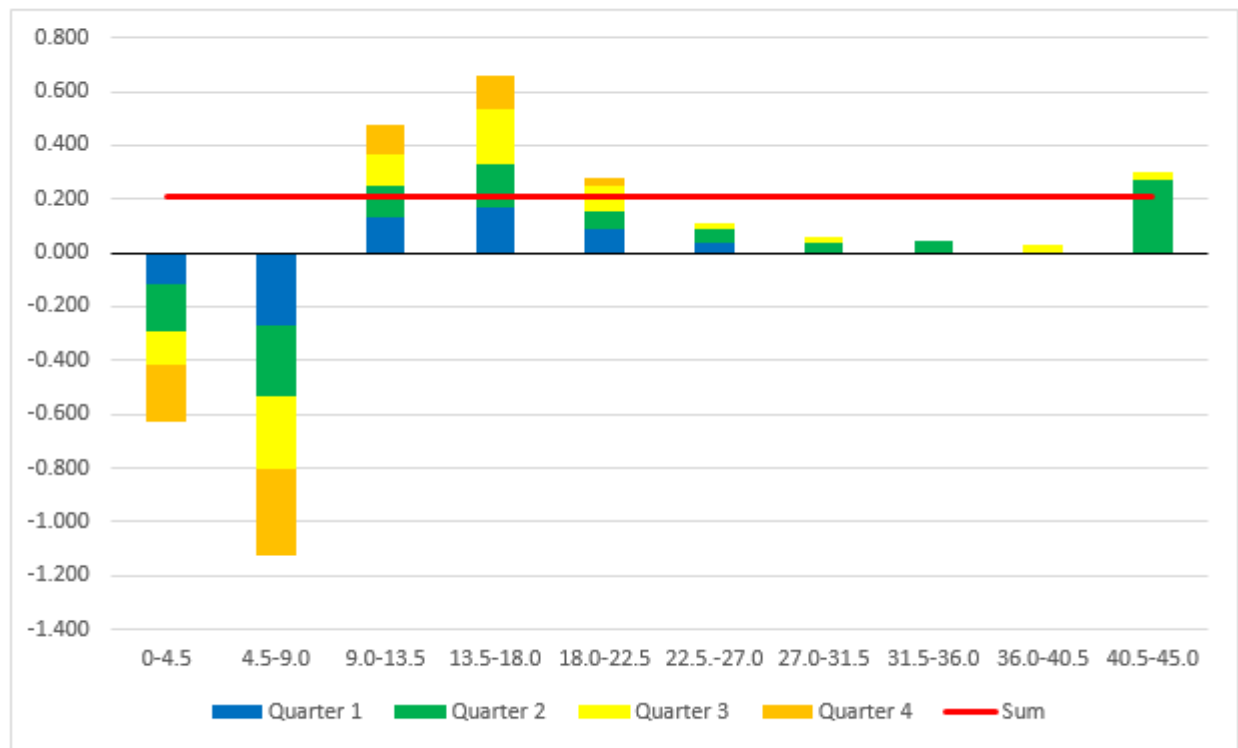


Figure C-1.2.8: Avalon PM_{2.5} Design Value Category Breakdown

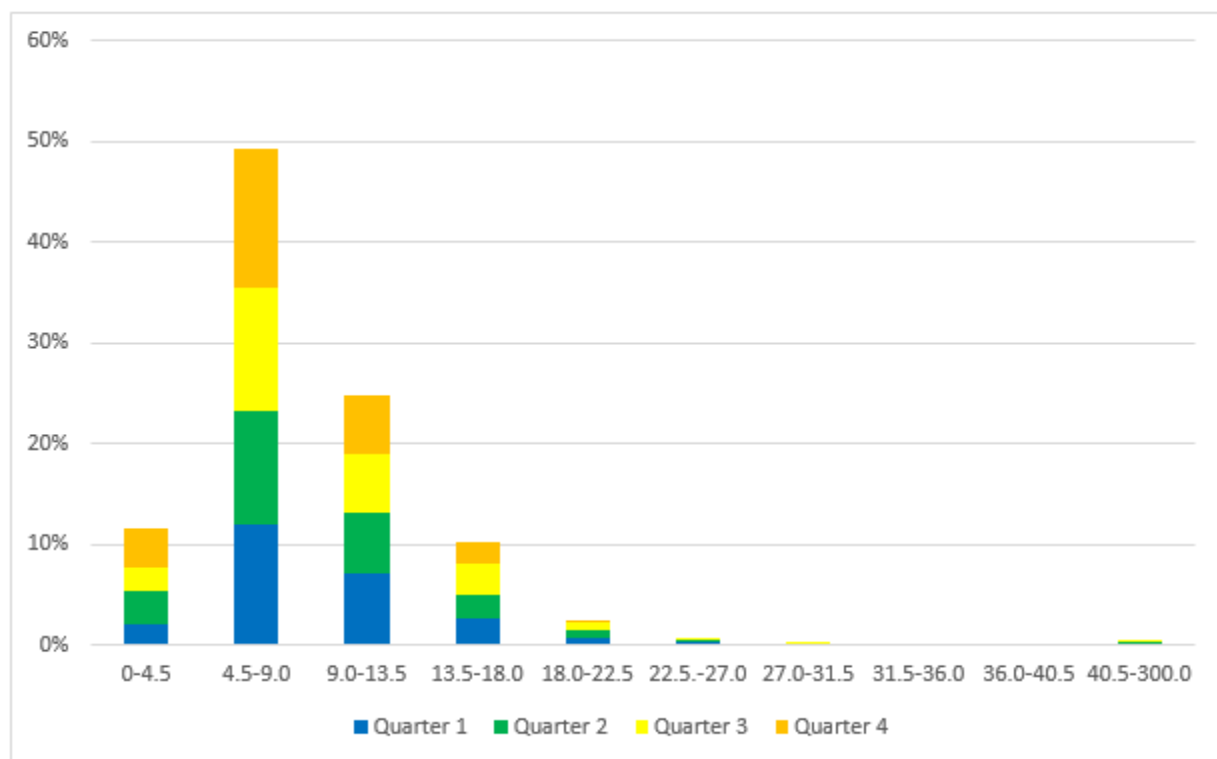


Figure C-1.2.9: Lawrenceville PM_{2.5} Design Value Contribution (µg/m³)

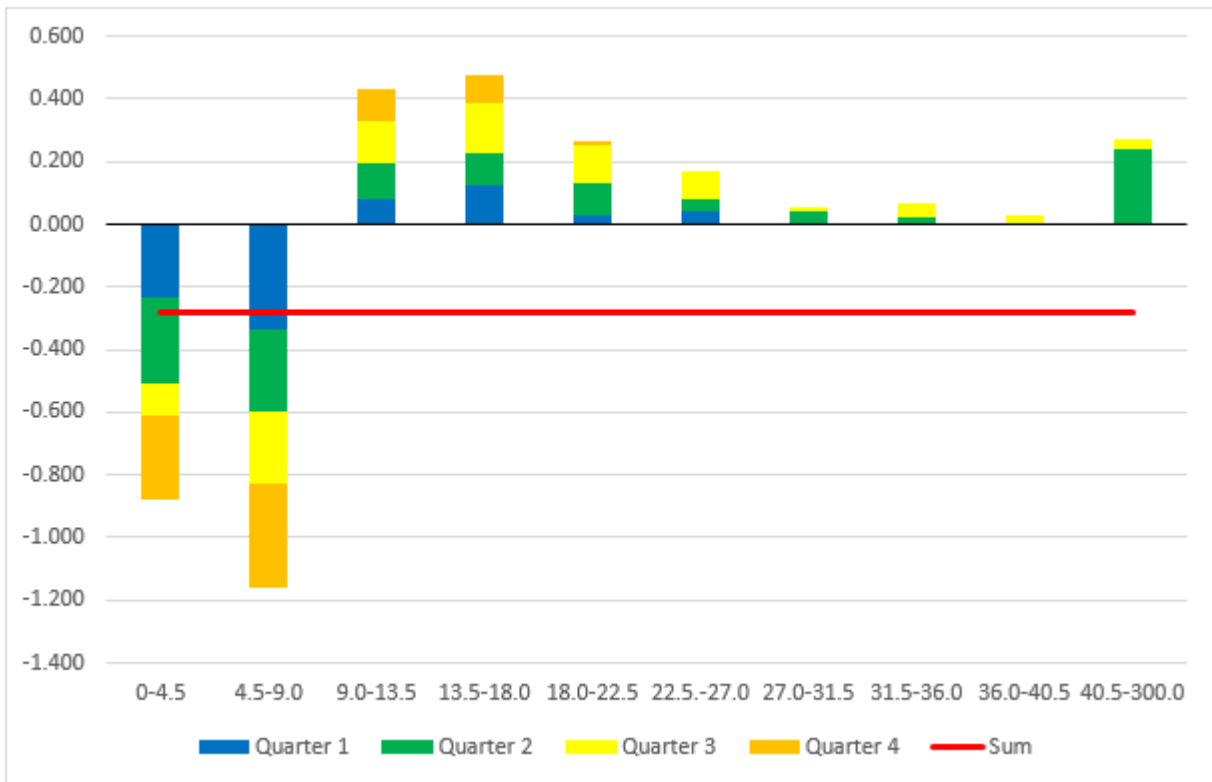


Figure C-1.2.10: Lawrenceville PM_{2.5} Design Value Category Breakdown

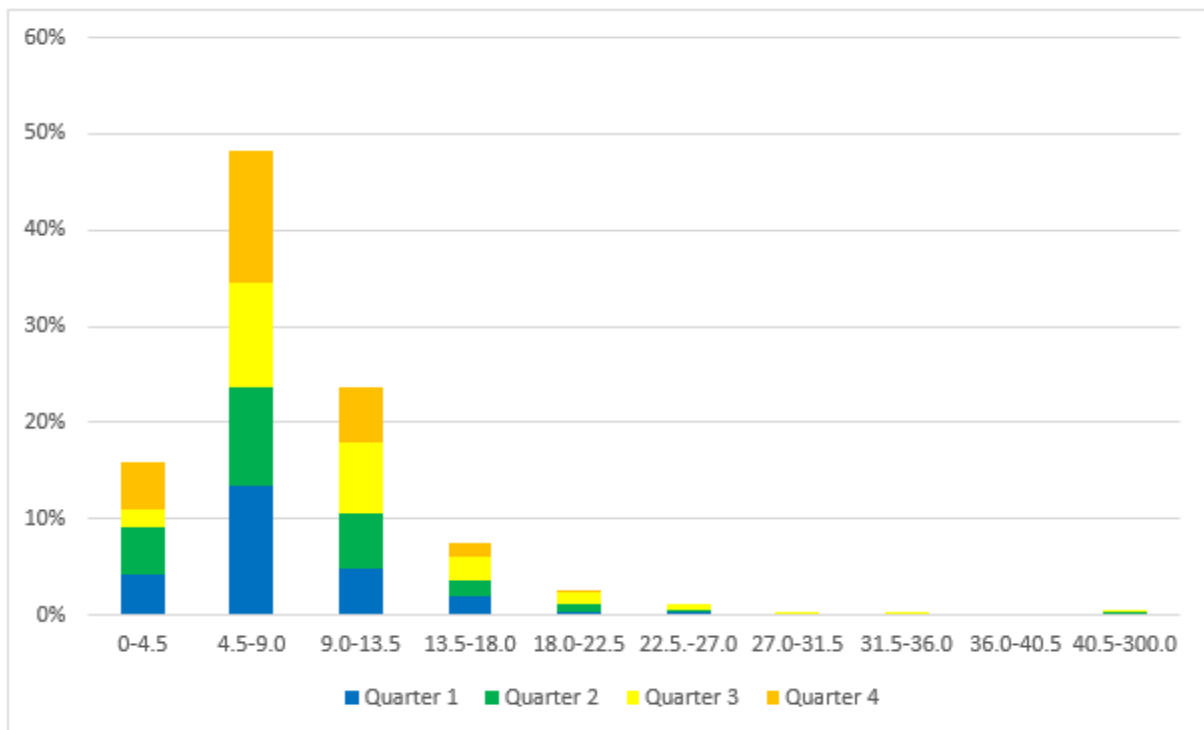


Figure C-1.2.11: Clairton PM_{2.5} Design Value Contribution (µg/m³)

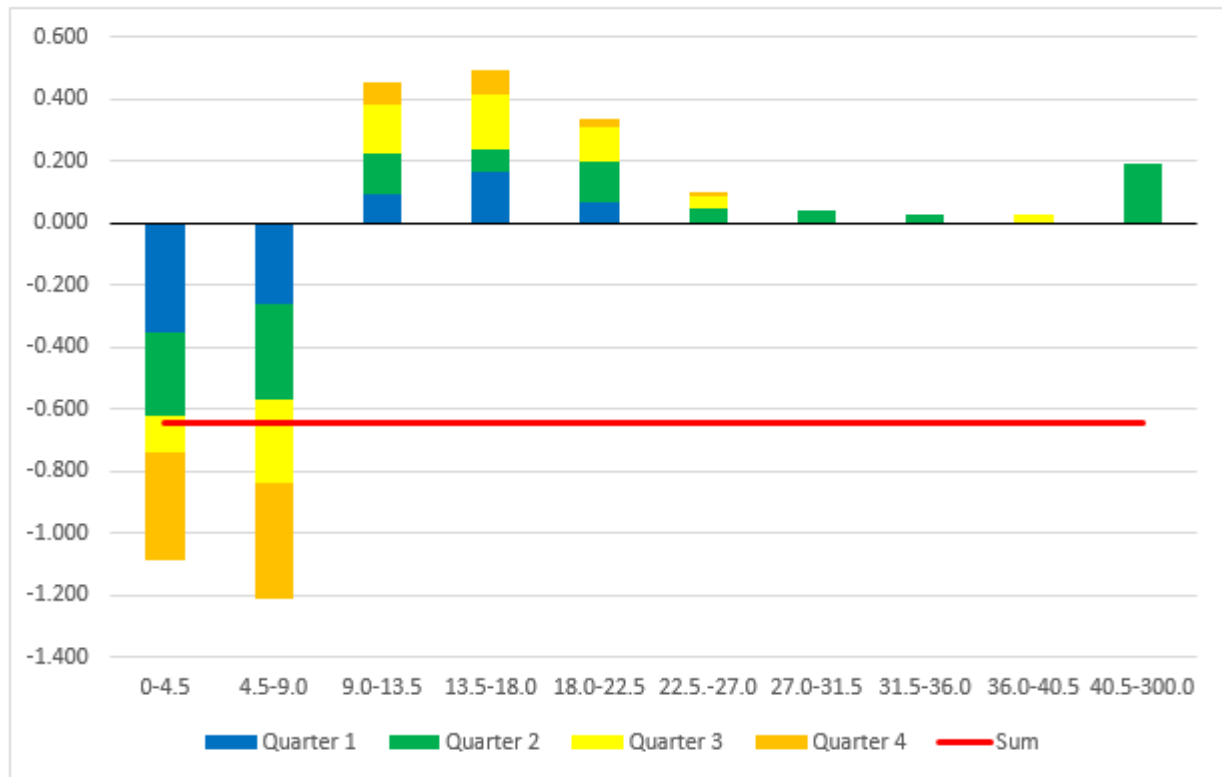


Figure C-1.2.12: Clairton PM_{2.5} Design Value Category Breakdown

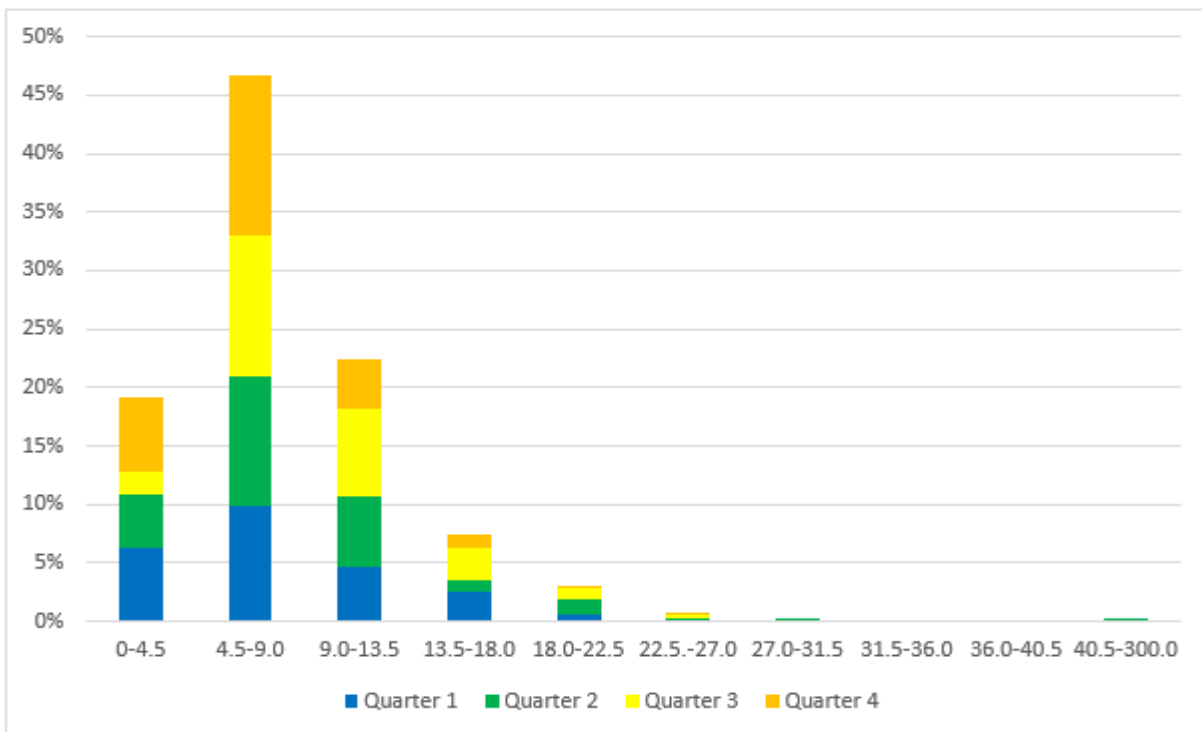


Figure C-1.2.13: Harrison PM_{2.5} Design Value Contribution (µg/m³)

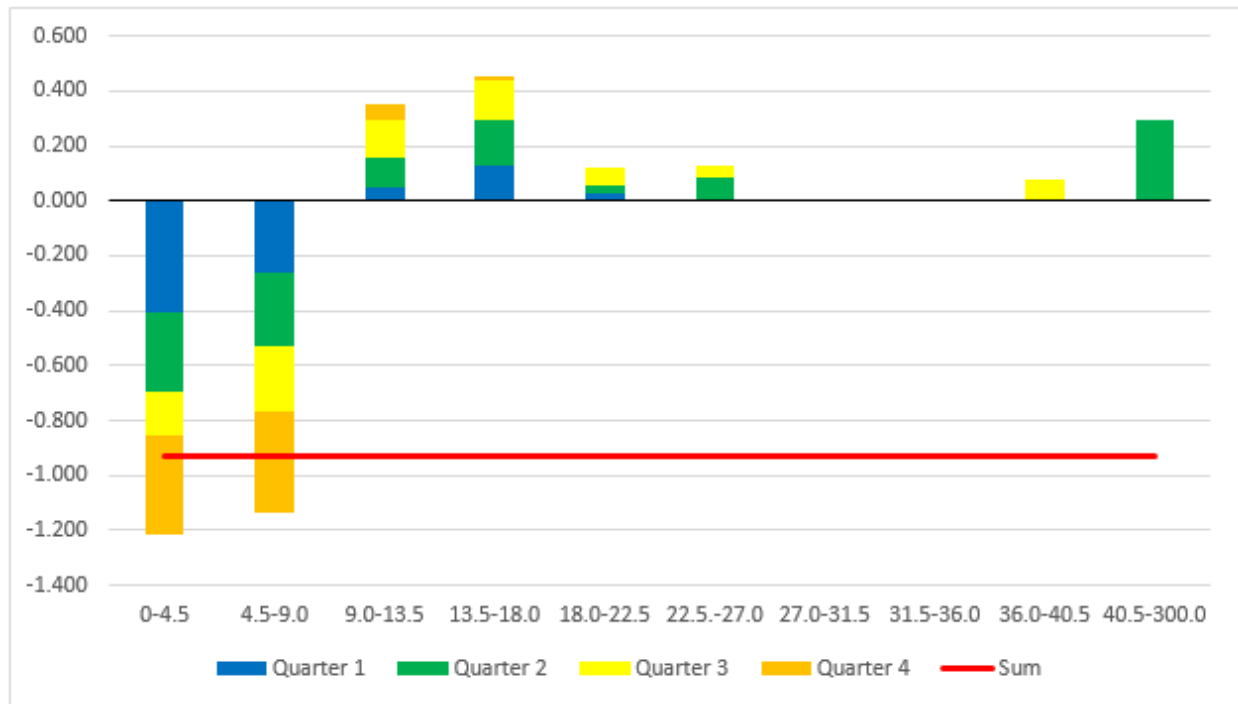


Figure C-1.2.14: Harrison PM_{2.5} Design Value Category Breakdown

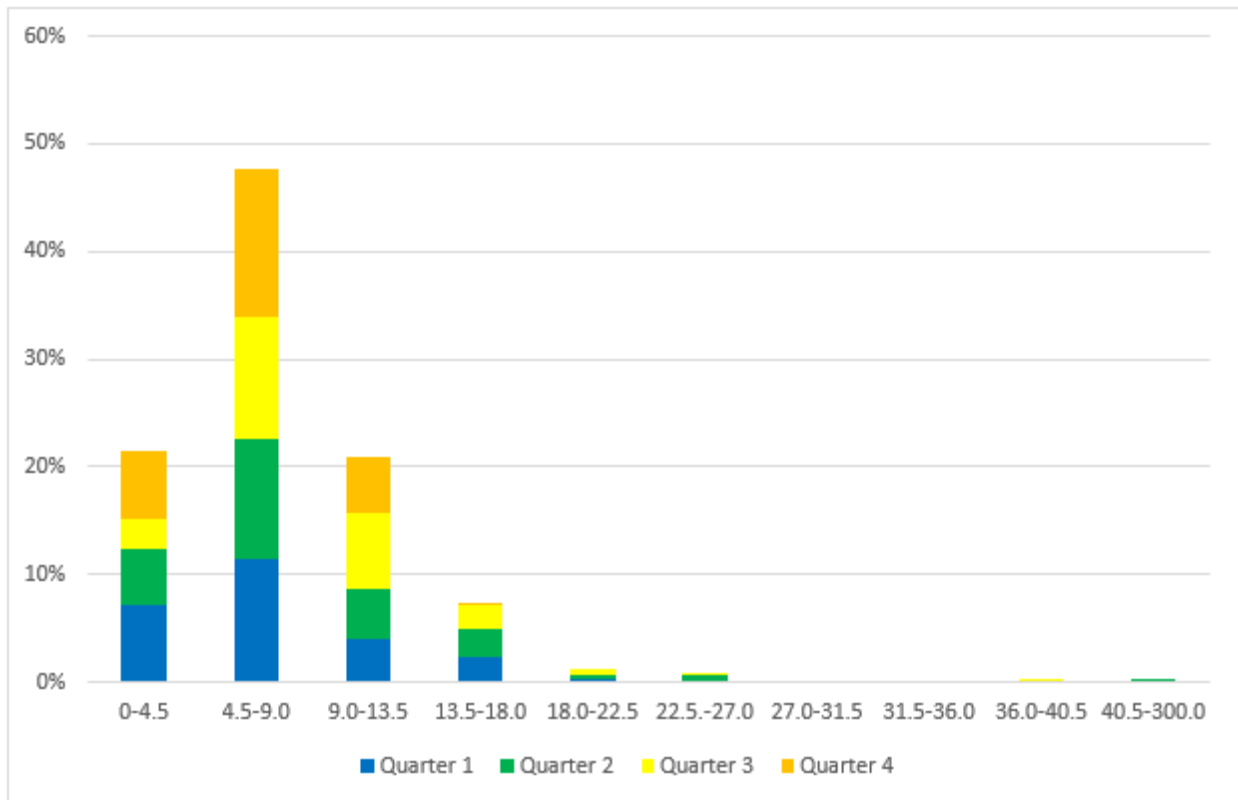


Figure C-1.2.15: South Fayette PM_{2.5} Design Value Contribution (µg/m³)

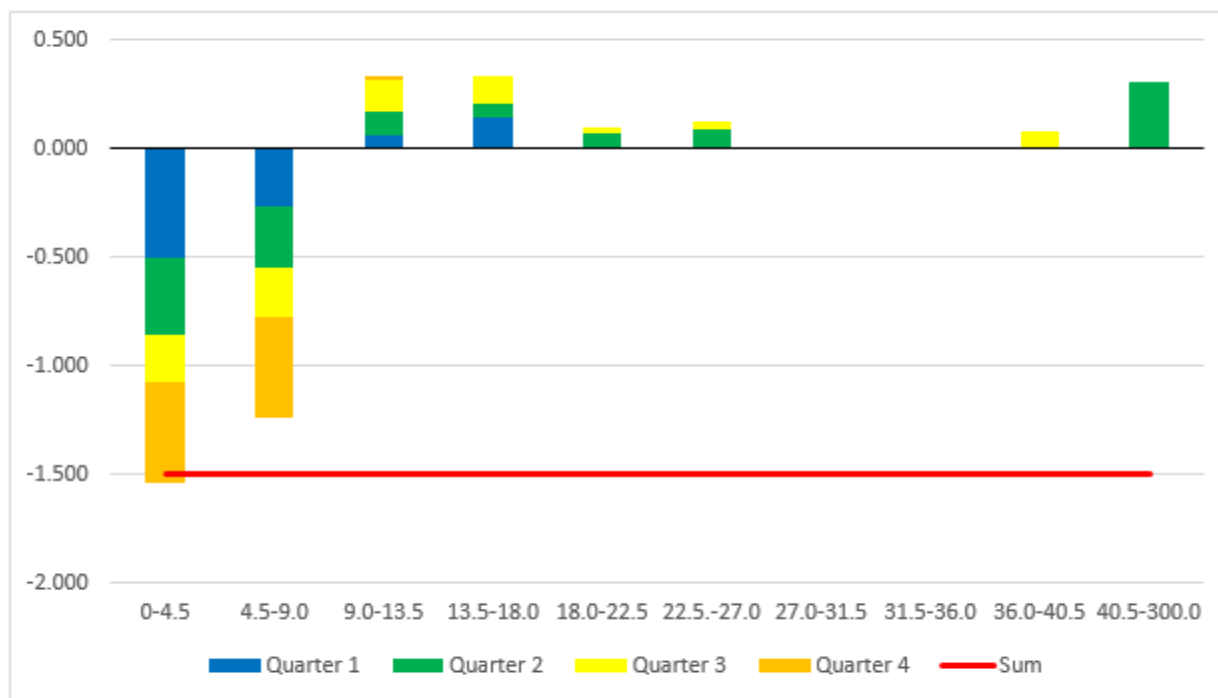


Figure C-1.2.16: South Fayette PM_{2.5} Design Value Category Breakdown

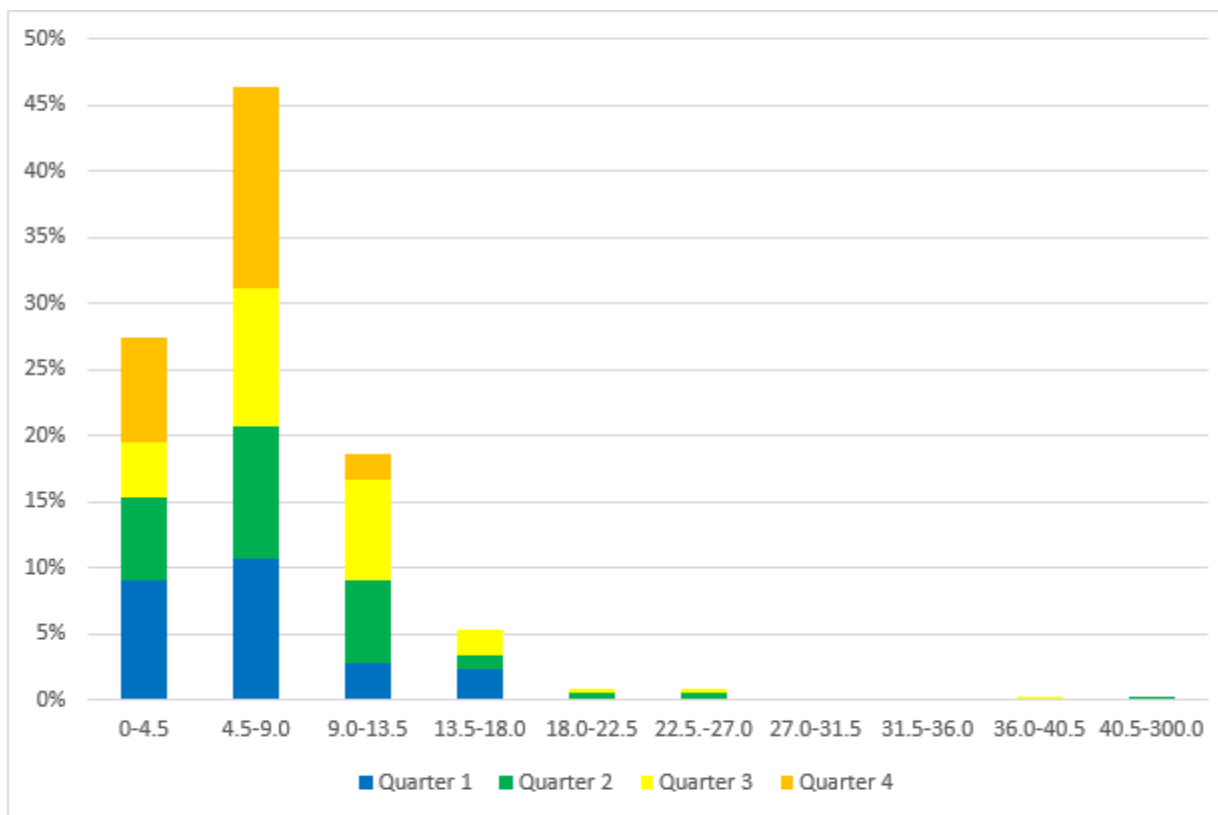


Figure C-1.2.17: Charleroi PM_{2.5} Design Value Contribution (µg/m³)

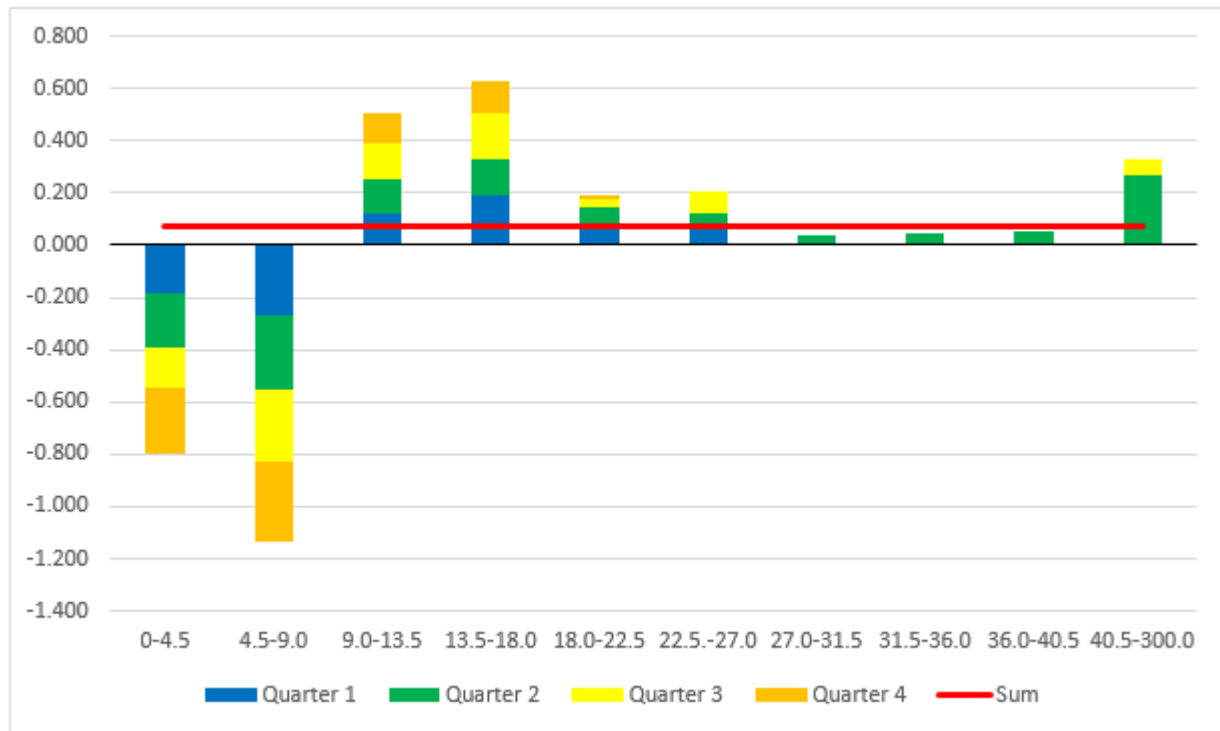


Figure C-1.2.18: Charleroi PM_{2.5} Design Value Category Breakdown

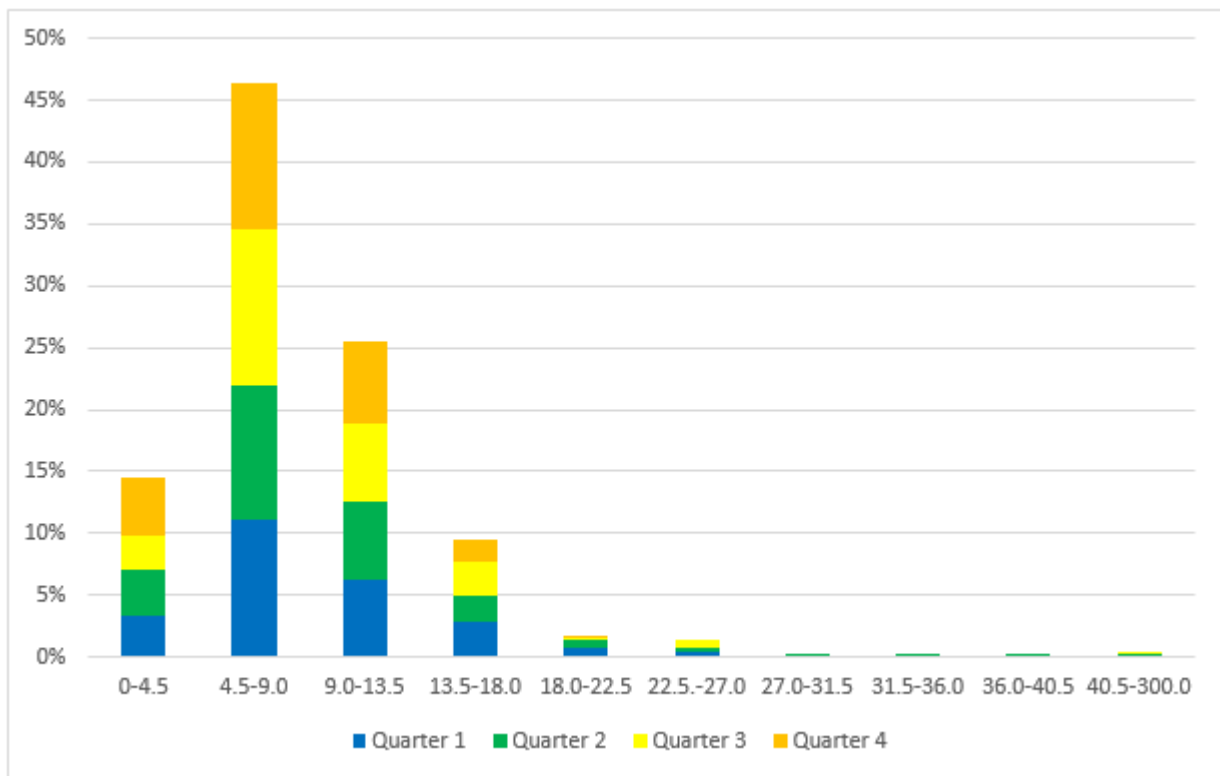


Figure C-1.2.19: Beaver Falls PM_{2.5} Design Value Contribution (µg/m³)

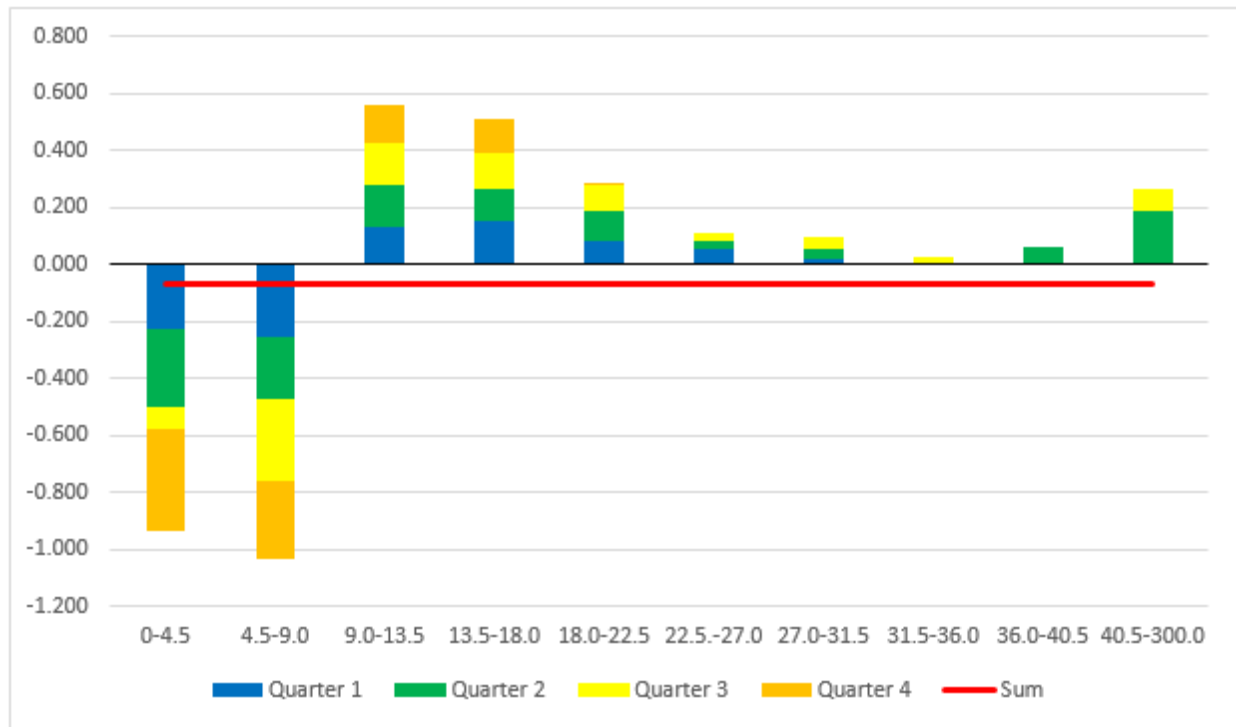


Figure C-1.2.20: Beaver Falls PM_{2.5} Design Value Category Breakdown

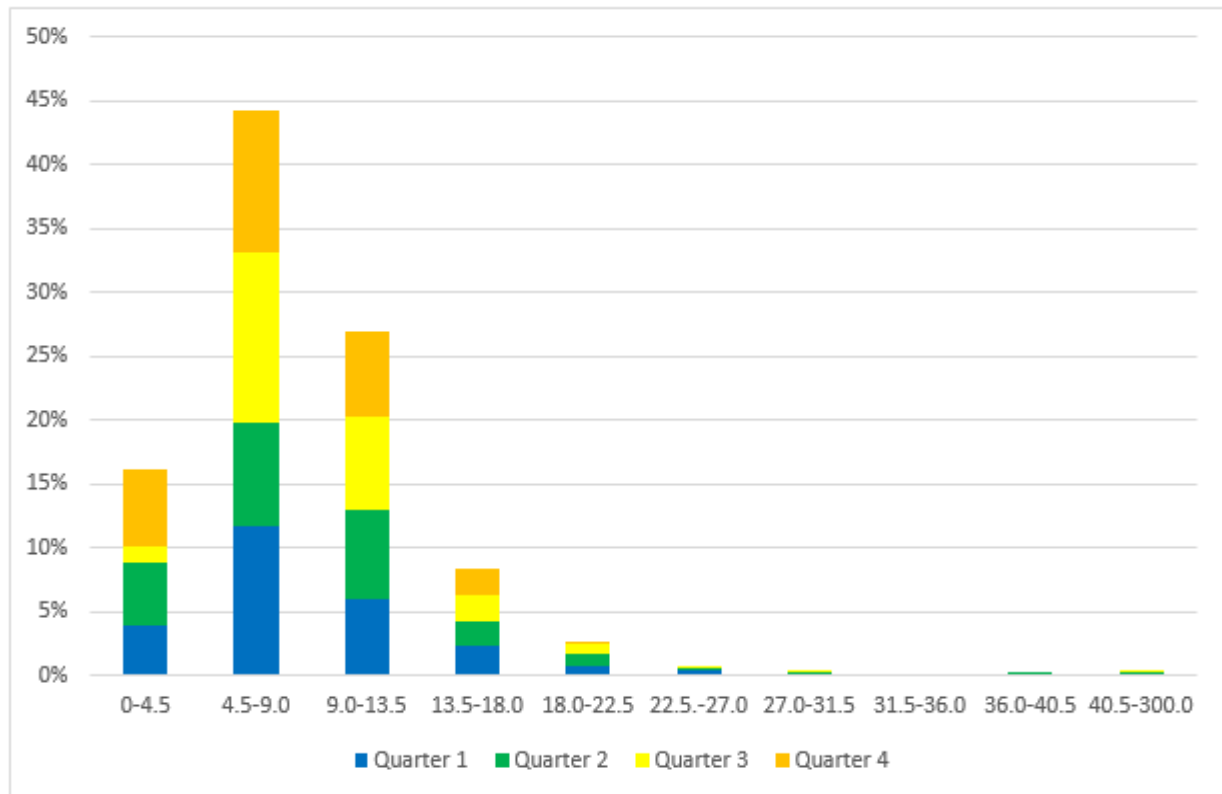


Figure C-1.2.21: Kittanning PM_{2.5} Design Value Contribution (µg/m³)

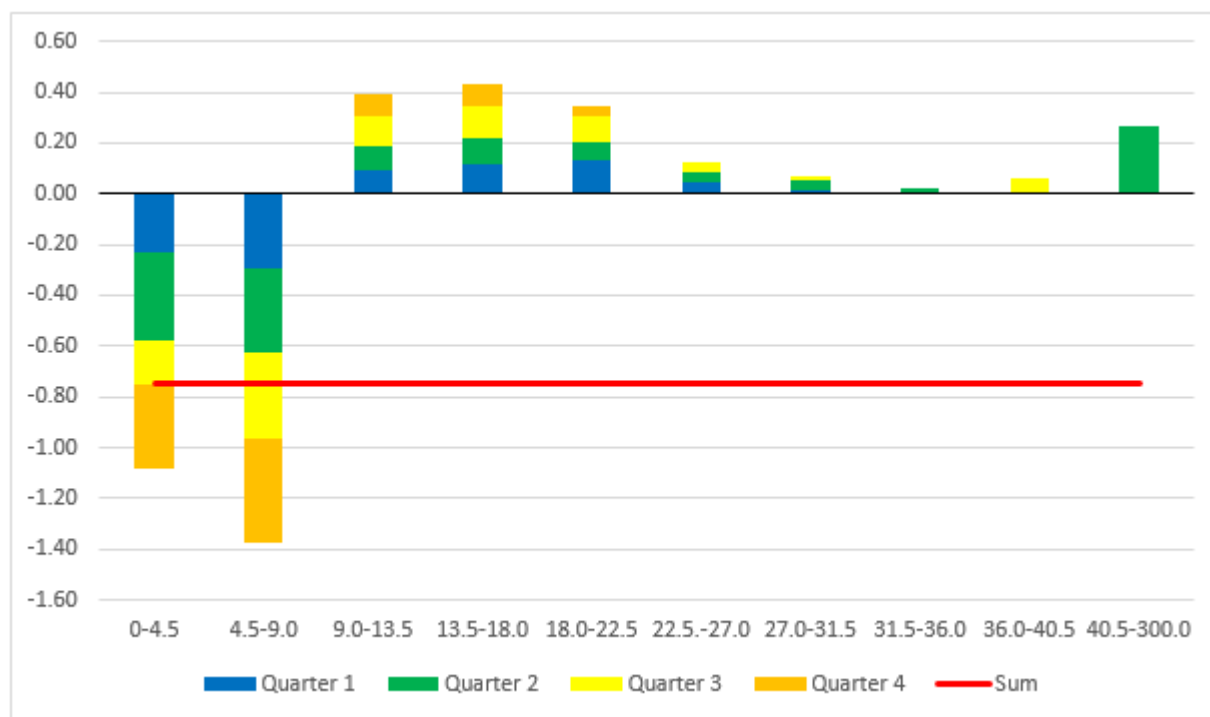


Figure C-1.2.22: Kittanning PM_{2.5} Design Value Category Breakdown

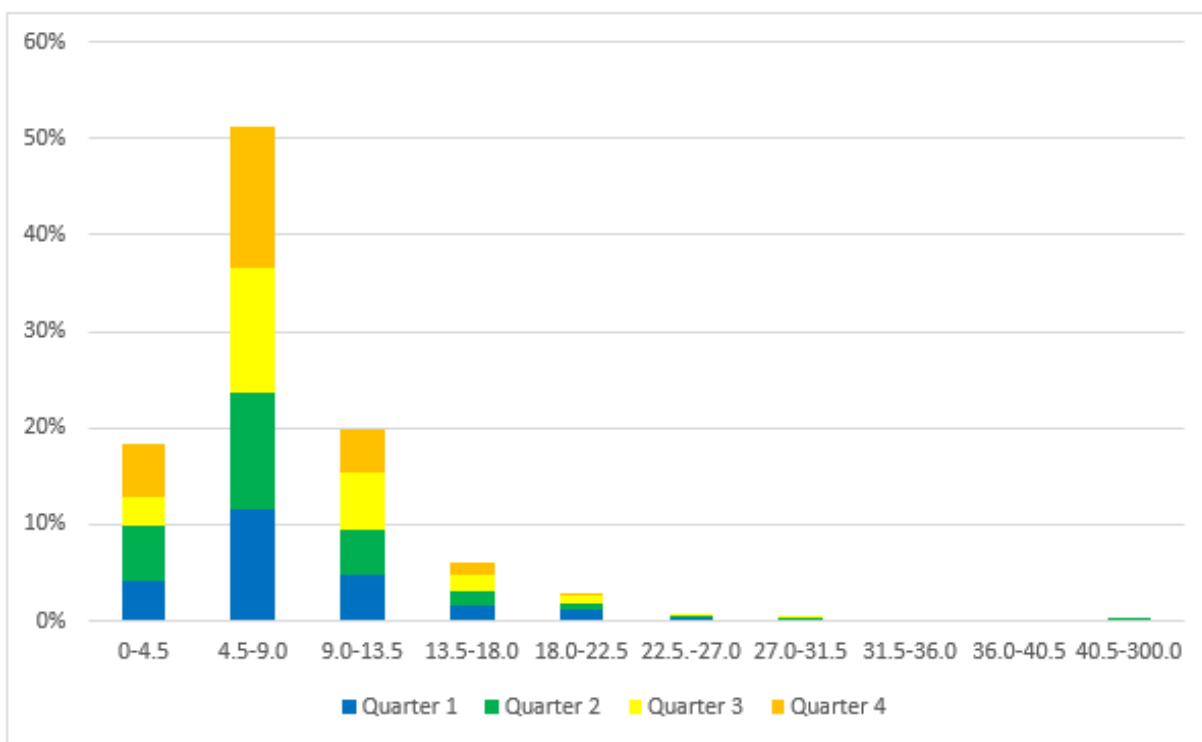


Figure C-1.2.23: Florence PM_{2.5} Design Value Contribution (µg/m³)

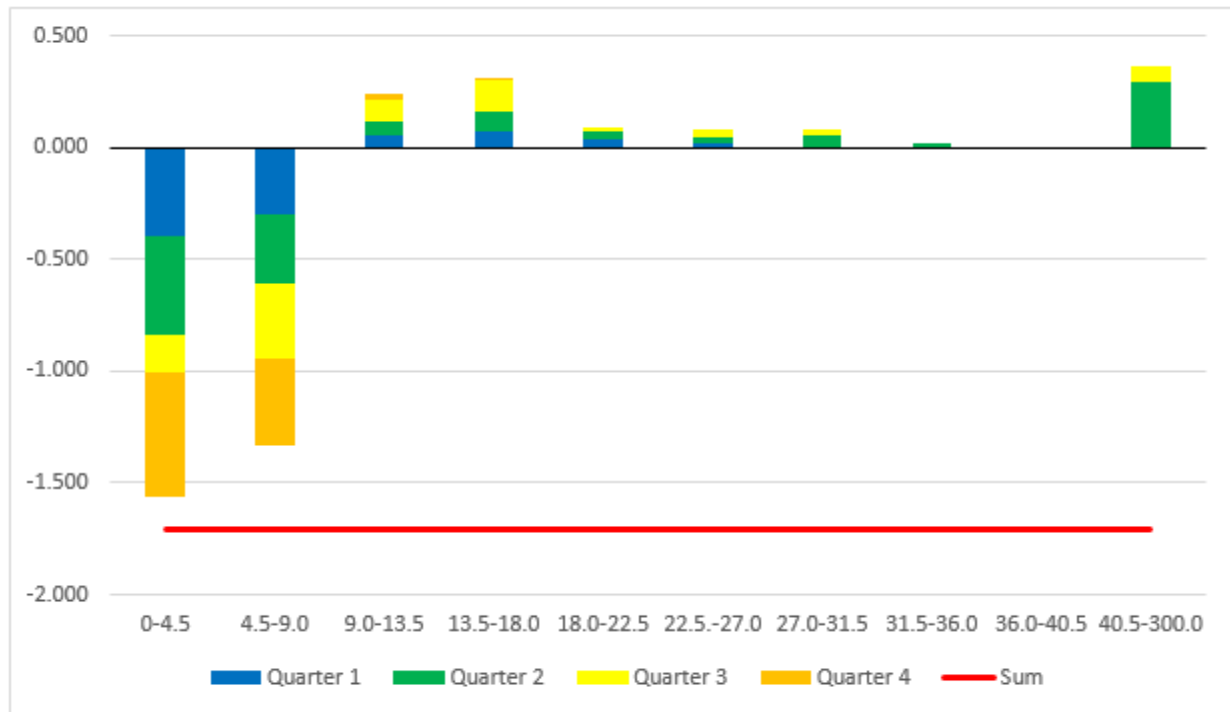


Figure C-1.2.24: Florence PM_{2.5} Design Value Category Breakdown

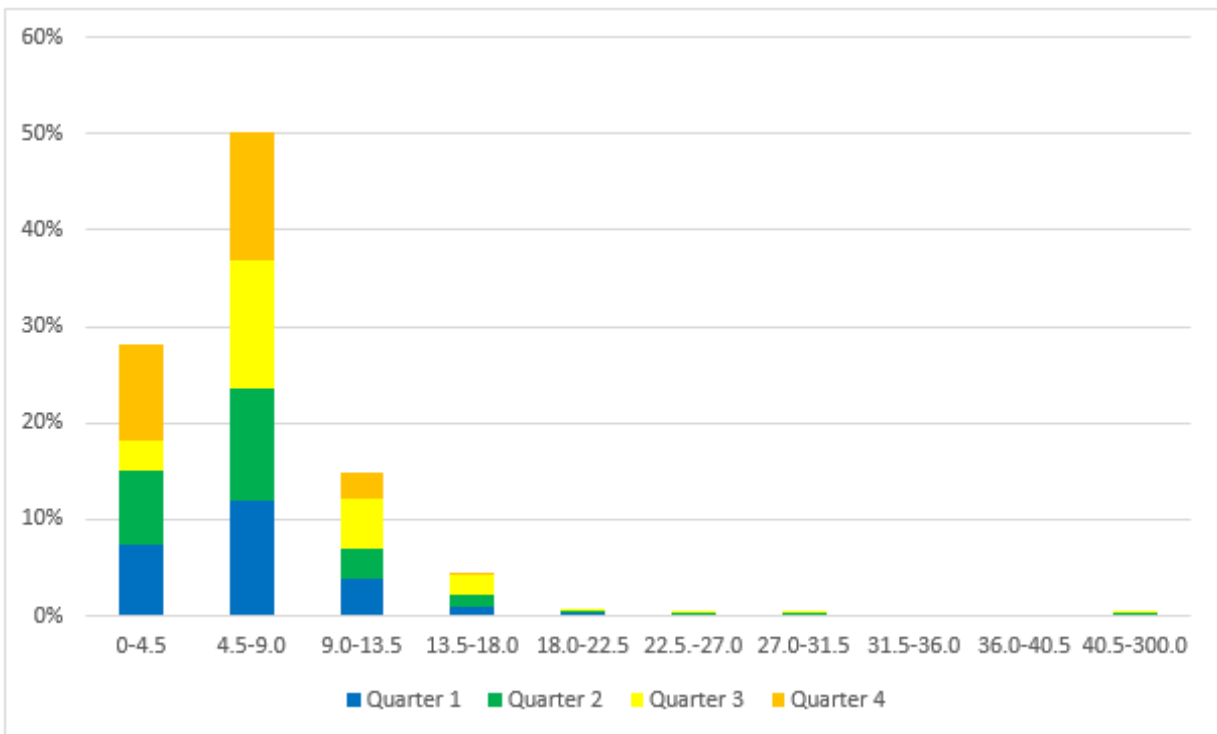


Figure C-1.2.25: Pittsburgh MSA PM_{2.5} Annual Design Value Contribution (µg/m³)

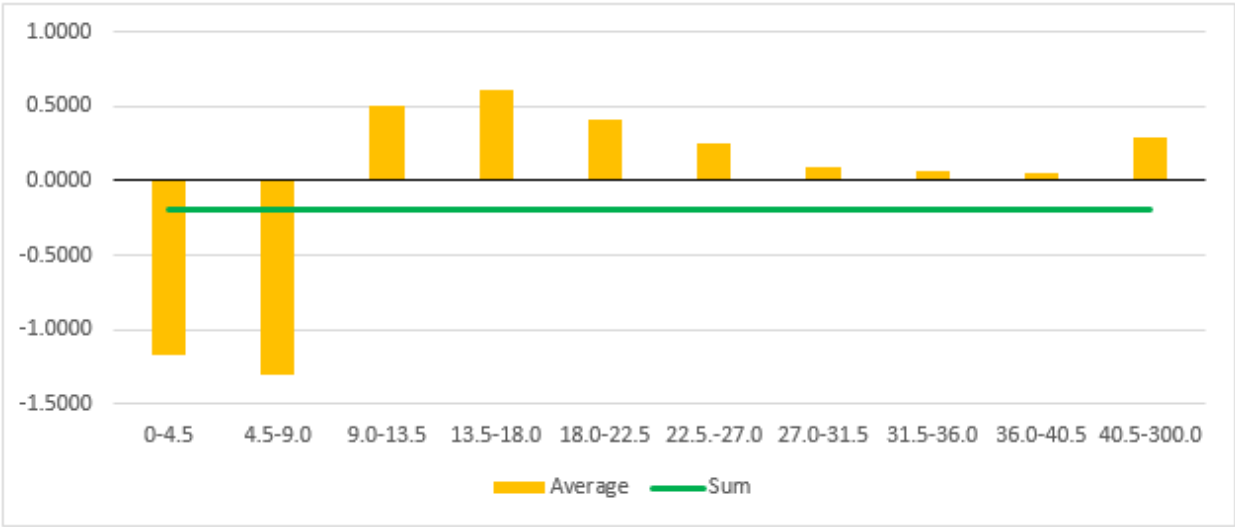


Table C-1.1 and Figures C-1.2.1–C-1.2.25 illustrate the differences between the monitors that are attaining the 2024 PM_{2.5} annual standard and the monitors that are not attaining the 2024 PM_{2.5} annual standard. The monitors that are not attaining the standard have relatively fewer “clean” days (0-9 µg/m³) than the monitors that are attaining the standard. For example, the Liberty monitor’s PM_{2.5} contribution to the design value in the 0-9.0 µg/m³ range was 0.45 µg/m³ lower than the Pittsburgh MSA average.

The analysis described in the remainder of this Appendix focuses on the violating monitors in Allegheny County (Liberty, North Braddock, Parkway East, Avalon). Figure C-1.3.1 illustrates the trend of annual averages while Figure C-1.3.2 illustrates the trend of annual design values for monitors in the Pittsburgh MSA with valid 2023 PM_{2.5} design values. The Liberty, North Braddock, Parkway East, and Avalon monitors have both a 2023 annual average and design value above the 2024 standard. Since 2014, annual PM_{2.5} levels have been in a general decline in the Pittsburgh MSA. A total of eight monitors in the Pittsburgh MSA are attaining the 2024 standard and continue to show a decline in annual average and annual design values: four monitors in Allegheny County (Lawrenceville, Clairton, Harrison, and South Fayette), two monitors in Washington County (Charleroi and Florence monitors), one monitor in Beaver County (Beaver Falls monitor) and one monitor in Armstrong County (Kittanning monitor).

It is important to note that 2023 was an extremely active year for Canadian wildfires, leading to an excessive amount of smoke transported into southwestern PA. Days with smoke impacts showed elevated concentrations (beyond what might have been expected), along with several exceedances of the 24-hour NAAQS. Informational qualifier codes were included in AQS for all Allegheny County data on a total of 24 sample days. With an exceptional event analysis submitted to EPA, exclusion of select days would lead to lower concentrations at all sites. However, since at least two monitors in Allegheny County would still be violating the 2024 standard even with several days excluded, an exceptional event exclusion analysis has not been prepared for any of the Allegheny County sites at the time of this analysis.

Figure C-1.3.1: Pittsburgh MSA PM_{2.5} Valid Annual Averages (µg/m³)

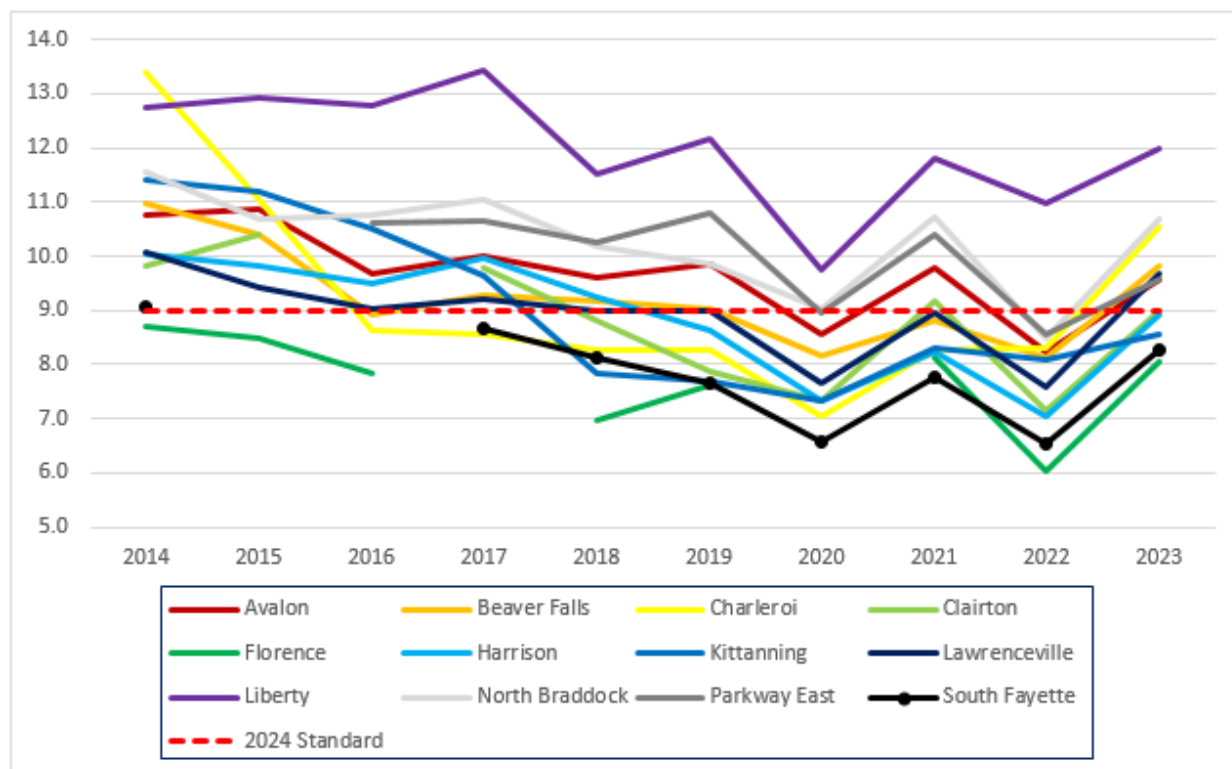
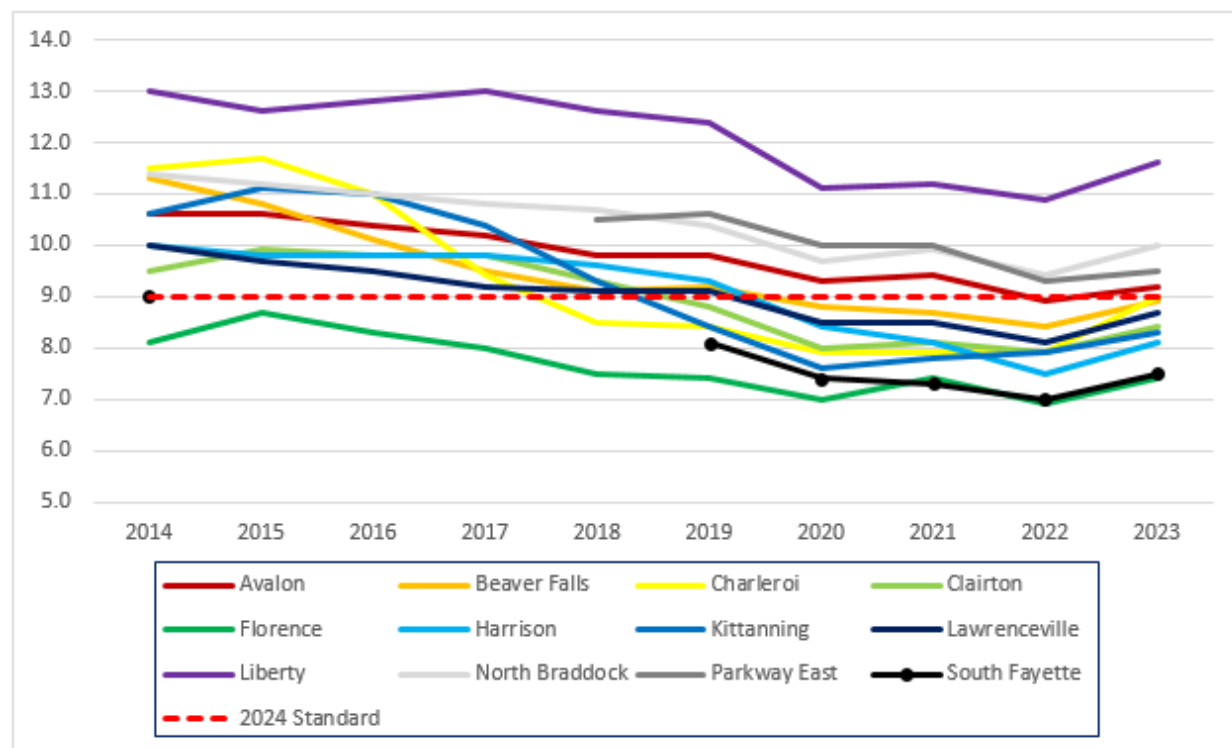


Figure C-1.3.2: Pittsburgh MSA PM_{2.5} Valid Annual Design Values (µg/m³)



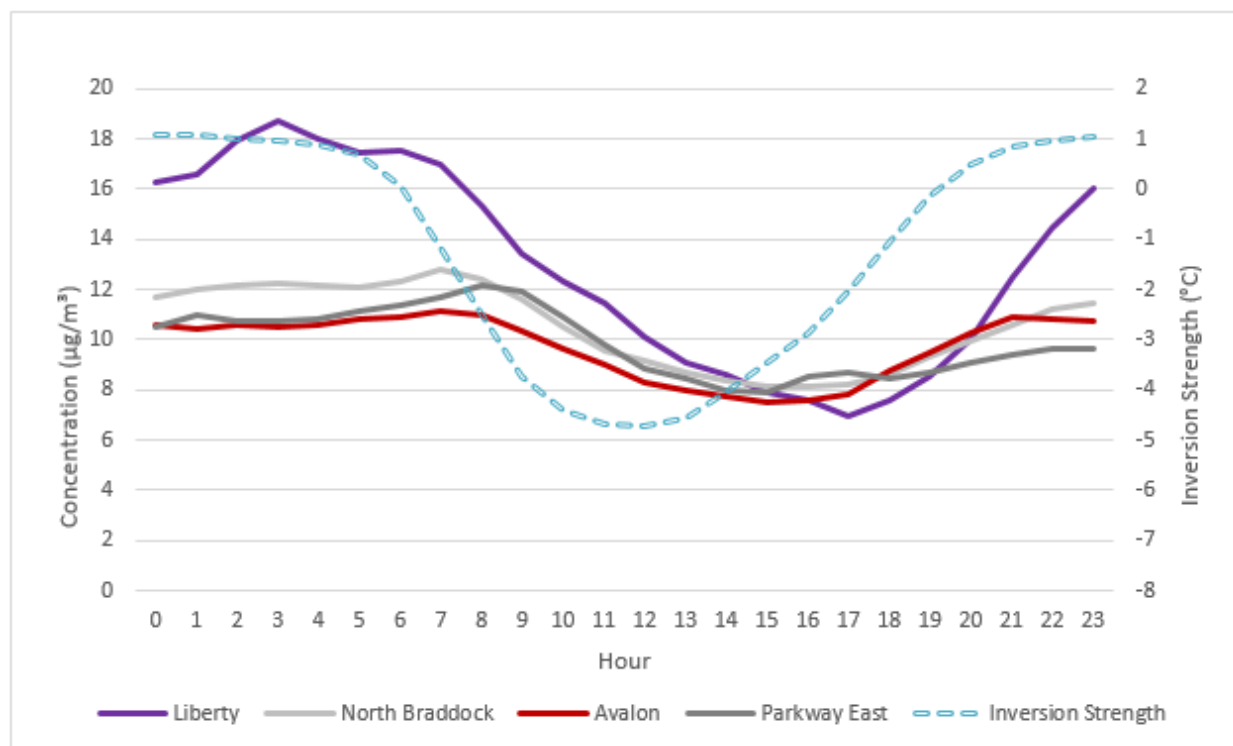
Additional analyses were completed to determine what was contributing to the fewer number of “clean” days at the Liberty, North Braddock, Parkway East, and Avalon monitors. PADEP identified days when these monitor’s PM_{2.5} concentrations were relatively high but regional monitoring concentrations in the Pittsburgh MSA were “clean.” Between 2021 and 2023, PADEP identified 233 days in which the Liberty monitor was at least one standard deviation above the Pittsburgh MSA regional average while the regional average was at or below 9 µg/m³, 94 days in which the North Braddock monitor was at least one standard deviation above the Pittsburgh MSA regional average while the regional average was at or below 9 µg/m³, 127 days in which the Parkway East monitor was at least one standard deviation above the Pittsburgh MSA regional average while the regional average was at or below 9 µg/m³, and 120 days in which the Avalon monitor was at least one standard deviation above the Pittsburgh MSA regional average while the regional average was at or below 9 µg/m³. The most extreme events (top 10%) were further analyzed to determine why these monitor’s concentrations were high when the Pittsburgh MSA average concentrations were low.

Meteorological Conditions Impacting High PM_{2.5} Days at the Liberty, North Braddock, Parkway East, and Avalon Monitors

The Pittsburgh MSA includes the City and Pittsburgh and the surrounding suburban municipalities. This includes the following air basins per Appendix B, Figure B-27: Allegheny County, Monongahela Valley, and Upper and Lower Beaver Valley. The densest area of population is within the City of Pittsburgh, while the greatest amount of industry is in the river valleys. Most of the region is dominated by complex terrain, consisting of rolling hills and river valleys with elevations varying from approximately 700 feet to over 1400 feet, with some ridgelines in the eastern portion of the Pittsburgh MSA exceeding 2500 feet. River valley meteorology, often with lower wind speeds than the surrounding hills and plateaus, and surface temperature inversions can substantially affect PM_{2.5} concentrations in Allegheny County.

The Liberty, North Braddock, Parkway East, and Avalon sites include continuous Federal Equivalent Method (FEM) monitors which can be examined for hourly trends. Additionally, ACHD operates sound detection and ranging (sodar) and radio acoustic sounding system (RASS) equipment in the Clairton area, which can be examined for hourly behavior in surface temperature inversions. Figure C-1.4.1 shows hourly average inversion strength (in °C) and hourly average PM_{2.5} concentrations (in µg/m³) for the violating sites in 2021-2023. (Note: Inversion strength and concentrations are shown on different axes in the figure.)

Figure C-1.4.1: Hourly Average Inversion Strength (°C) and PM_{2.5} Concentrations (µg/m³) at Allegheny County Violating Sites, 2021-2023



All sites show increased concentrations during nighttime hours when inversions are present. Liberty shows the strongest dependence on inversions, suggesting that nearby source emissions are being trapped within inversions on a regular basis. North Braddock and Avalon are also adjacent to industrial areas that may be influencing concentrations more than in other regions of Allegheny County. Note also that the Parkway East shows peaks during typical rush hour periods, which is unique to this site as the near road monitor for the Pittsburgh MSA.

Figure C-1.5.1 illustrates the sources within the immediate proximity of the Liberty, North Braddock, Avalon, and Parkway East monitors. Using the meteorological station at the Pittsburgh International Airport (KPIT), Figure C-1.5.2 illustrates the frequency of wind distribution coming from a particular direction.

**Figure C-1.5.1: Pittsburgh MSA
Major Sources (Over 100 Tons Per Year) Based on PADEP 2022 Emission Inventory**

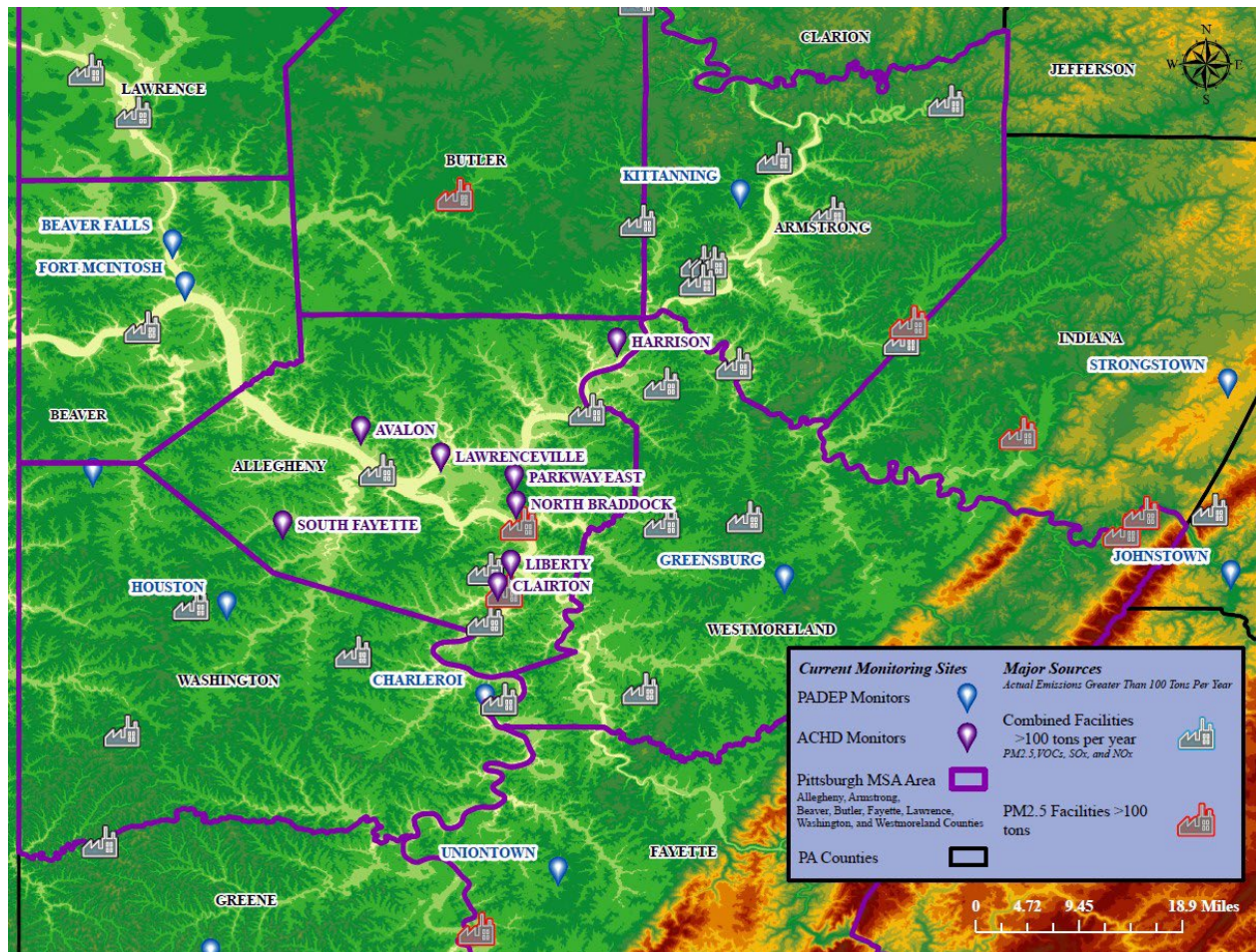


Figure C-1.5.1 shows that while there are multiple major stationary point sources within the Pittsburgh MSA and surrounding counties, the largest cluster of sources are within the Monongahela Valley in Allegheny County, in close proximity to the Liberty and North Braddock monitors. Figures B-21 through B-24 in Appendix B show that these sources emit high amounts of PM_{2.5} and precursors relative to other sources in PA. Figure B-6 in Appendix B also shows that PM_{2.5} area source emission density (in tons per year per square mile) is greatest for Allegheny County within the Pittsburgh MSA. Figures B-11 through B-20 in Appendix B show that on-road and non-road source emissions are also greatest in Allegheny County. The largest point sources in Armstrong and Indiana Counties are power plants with tall stacks.

**Figure C-1.5.2: Pittsburgh MSA
Pittsburgh International Airport (KPIT) Wind Rose**

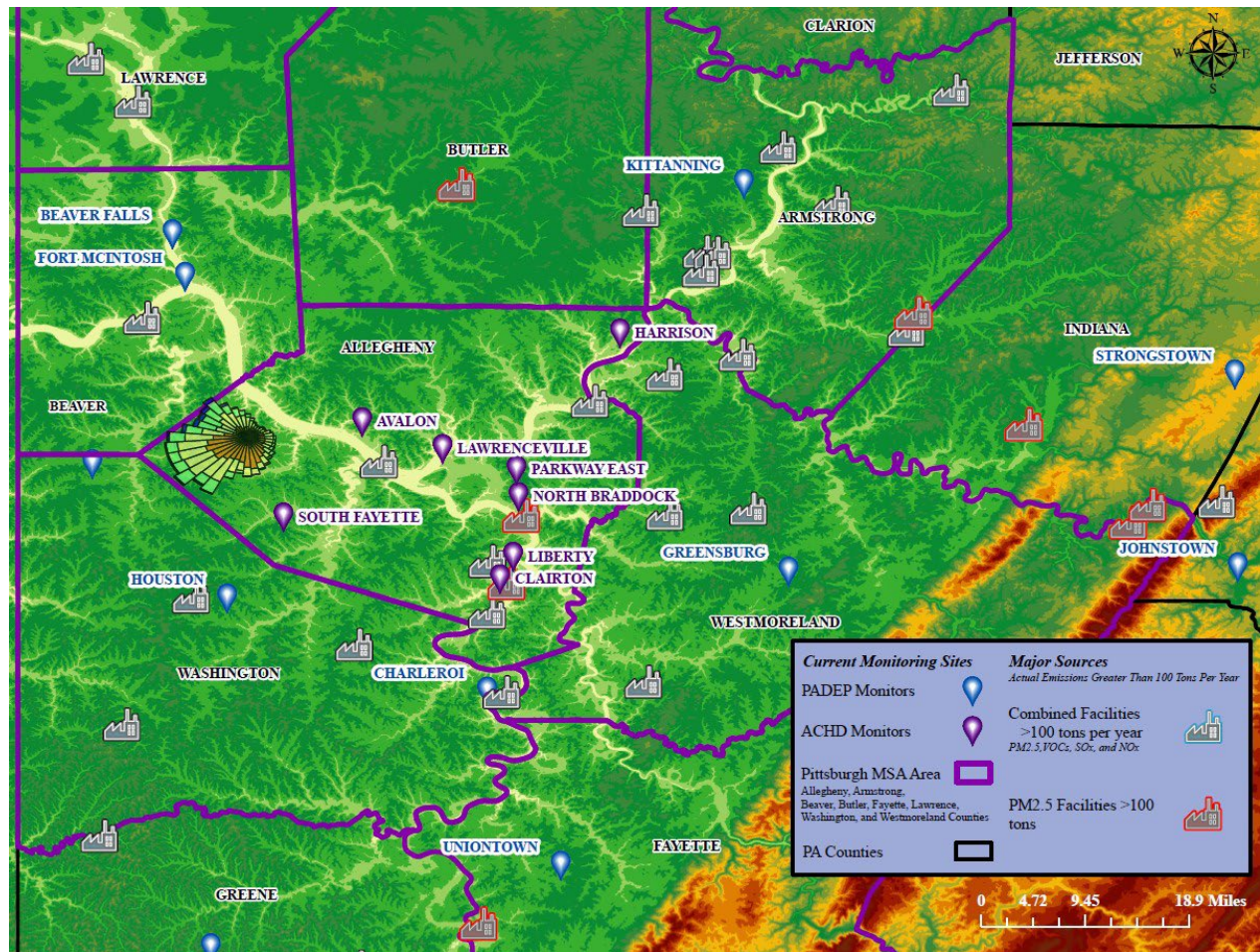


Figure C-1.5.2 shows that, based on the KPIT wind data from 2021-2023, the predominant wind flow is from the west/southwest in the Pittsburgh region. This westerly mesoscale flow can lead to accumulation of impacts throughout Allegheny County from both transported and locally formed emissions. Since surrounding county monitors are attaining the NAAQS, it can be assumed that urban and local source influences within Allegheny County are the driving factors for nonattainment at the violating monitors. It can also be assumed that large sources to the east of Allegheny County are unlikely to contribute to nonattainment, as they are in distant downwind locations from the violating monitors.

Local meteorological data are also available at select sites in Allegheny County, including the Liberty and North Braddock monitors. (As mentioned earlier, Parkway East is a near road site that is affected by microscale roadway emissions which impact the site from nearly all directions.) The local meteorological data can be used in conjunction with concentration data to generate pollution roses for wind directions during the highest concentrations of PM_{2.5}.

Figure C-1.5.3 shows pollution roses for the Liberty and North Braddock sites, showing average hourly PM_{2.5} concentrations (in $\mu\text{g}/\text{m}^3$) when winds are from 16 different points of compass during the timeframe 2021-2023.

Figure C-1.5.3: Liberty and North Braddock Pollution Roses, 2021-2023

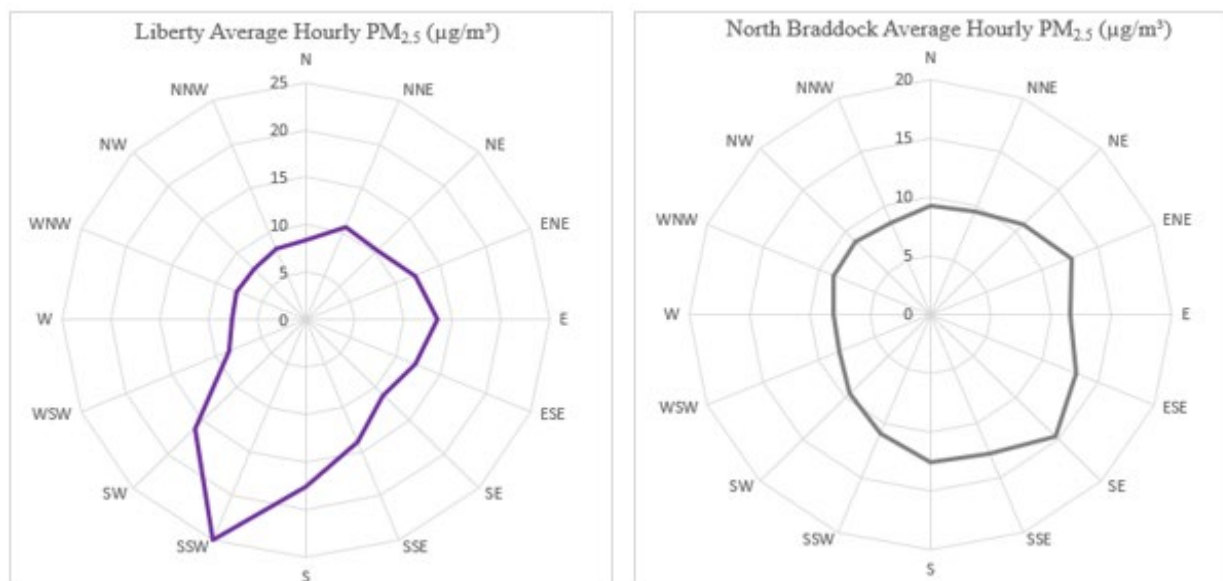
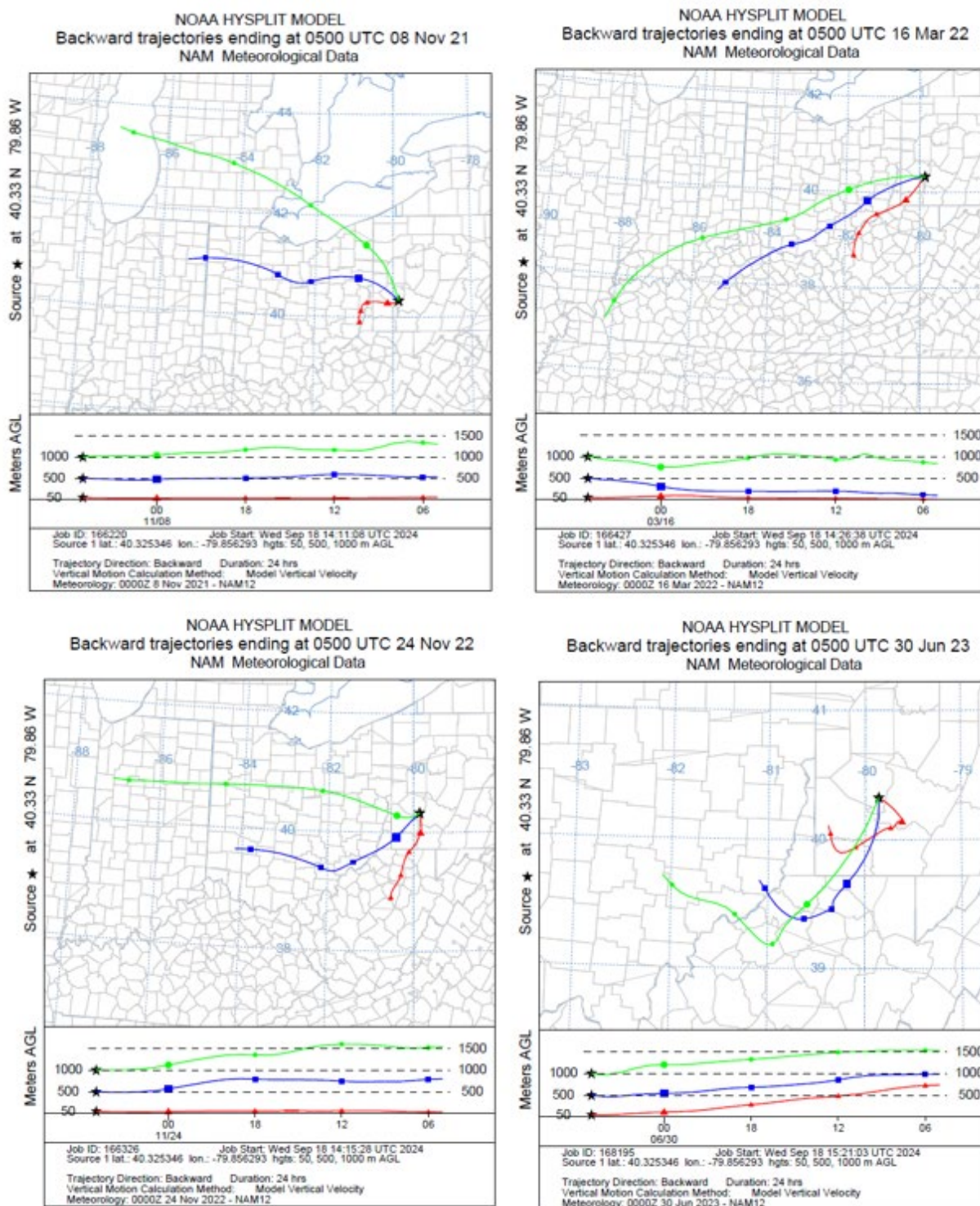


Figure C-1.5.3 shows that the Liberty and North Braddock concentrations are affected at the local scale from specific directions within the Monongahela Valley. For the Liberty site, the concentrations are highest when winds are from the south-southwest (SSW). For the North Braddock site, concentrations are highest when winds are from the southeast (SE). While other sources contributions may be affecting these sites to some degree, the peak PM_{2.5} concentrations are driven by local source contributions in these directions.

The HYSPLIT model can also be used to examine the back-trajectories of air parcels on selected high days. HYSPLIT results can indicate the general locations from which PM_{2.5} and precursors are being transported into or recirculated within an area.

For Figure C-1.5.4, Liberty episodes were first examined over the 2021-2023 timeframe. These include days when the Liberty monitor had elevated concentrations over a period of one or more consecutive days. For the top four highest days during different episodes, the 24-hour back-trajectories were computed by the model. Three different heights were used (50, 500, and 1000 meters) to examine the potential long-range and local transport.

Figure C-1.5.4: HYSPLIT Back-Trajectories During Liberty Episodes



The HYSPLIT results suggest that localized impacts at Liberty are affected at the lowest heights by sources at relatively short distances. These low-level impacts are likely based on primary PM_{2.5} emissions during low winds and strong temperature inversions, while additional transport of precursors at higher heights and/or from outside the Pittsburgh MSA may also be contributing to secondary PM_{2.5} contributions.

The Change in the Composition of the PM_{2.5}

Within the Pittsburgh MSA, ACHD operates speciation monitors at Lawrenceville and Liberty, and PADEP operates speciation monitors at Florence and Greensburg. Just to the east of the Pittsburgh MSA, PADEP also operates a speciation monitor at Johnstown (AQS ID# 42-021-0011), which has been included here in the compositional analysis.

Florence (AQS ID# 42-125-5001) is in a rural location in Washington County and is less affected by source influences near the monitor. For that reason, the Florence monitor best reflects the transport that is coming into western Pennsylvania from areas to the west (prevailing wind flow is from west to east across Pennsylvania). The other speciation monitors can be examined in comparison to Florence for urban (or localized) excess contributed by the Pittsburgh MSA or by source influences within the Pittsburgh MSA.

Based on the seasonal formation of different types of species, it might be expected the ammonium nitrate have decreased in cold seasons and ammonium sulfate have decreased in warm seasons. Reductions from motor vehicle emissions and industrial activities might be expected to show year-round decreases in carbon concentrations.

Figures C-1.6.1 - C.4.6.2, C-1.6.4 - C.4.6.5, C-1.6.7 - C.4.6.8, and C-1.6.10 - C.4.6.12 outline the main speciated components of PM_{2.5} during each quarter: ammonium, nitrate, sulfate, organic carbon (OC), elemental carbon (EC), soil, and elements. Figures C-1.6.3, C-1.6.6, C-1.6.9, and C-1.6.12 illustrate the decline in the main speciated components of PM_{2.5} from the 2016 to 2018 period to the 2021 to 2023 period.

Figure C-1.6.1: 2016-2018 Quarter 1 PM_{2.5} Average Speciation Concentrations (µg/m³)

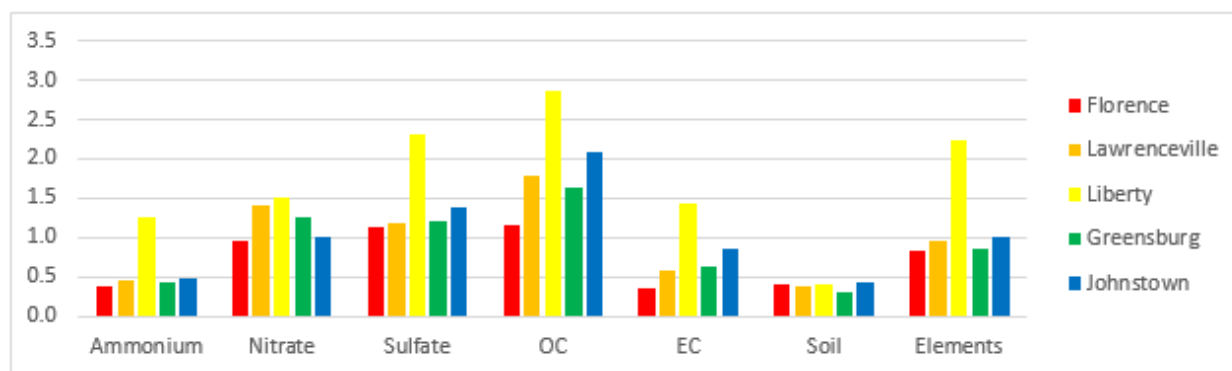


Figure C-1.6.2: 2021-2023 Quarter 1 PM_{2.5} Average Speciation Concentrations (µg/m³)

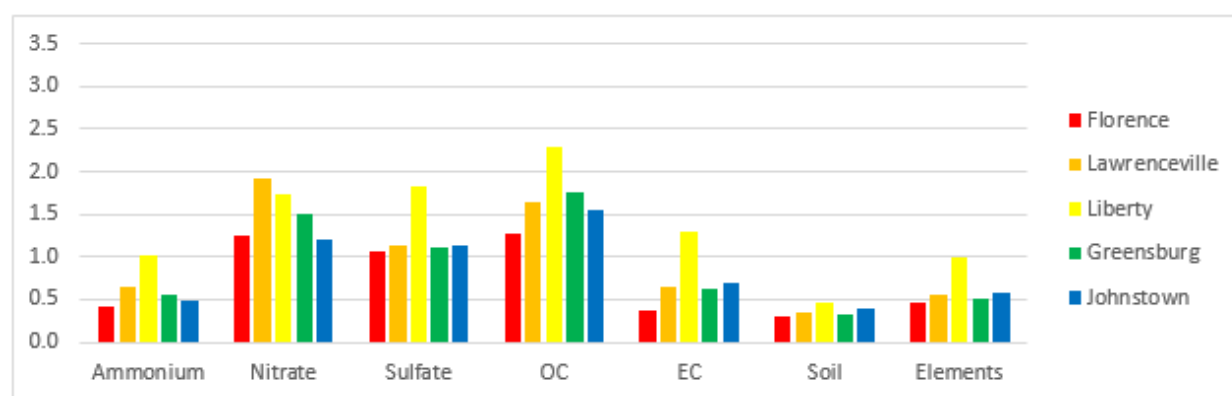


Figure C-1.6.3: Comparison of Quarter 1 PM_{2.5} Average Speciation Concentrations(µg/m³) 2021-2023 minus 2016-2018

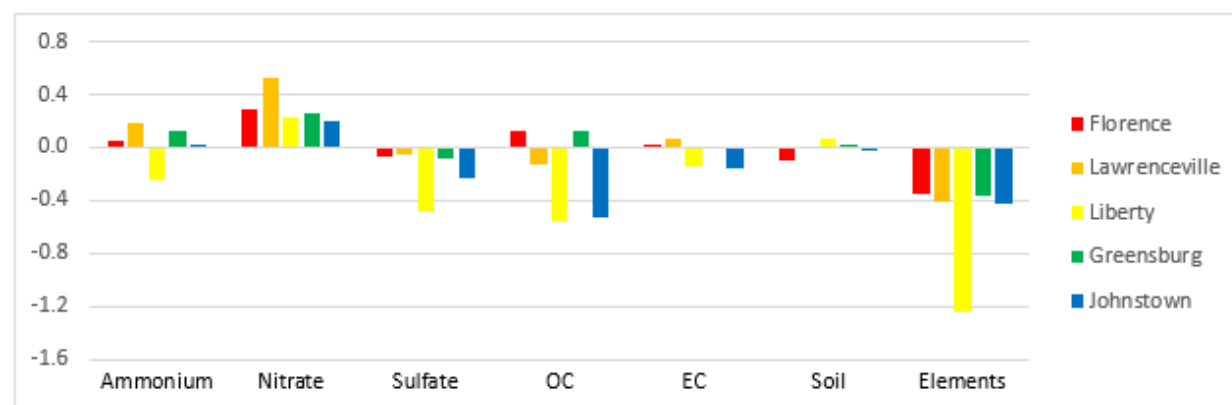


Figure C-1.6.4: 2016-2018 Quarter 2 PM_{2.5} Average Speciation Concentrations (µg/m³)

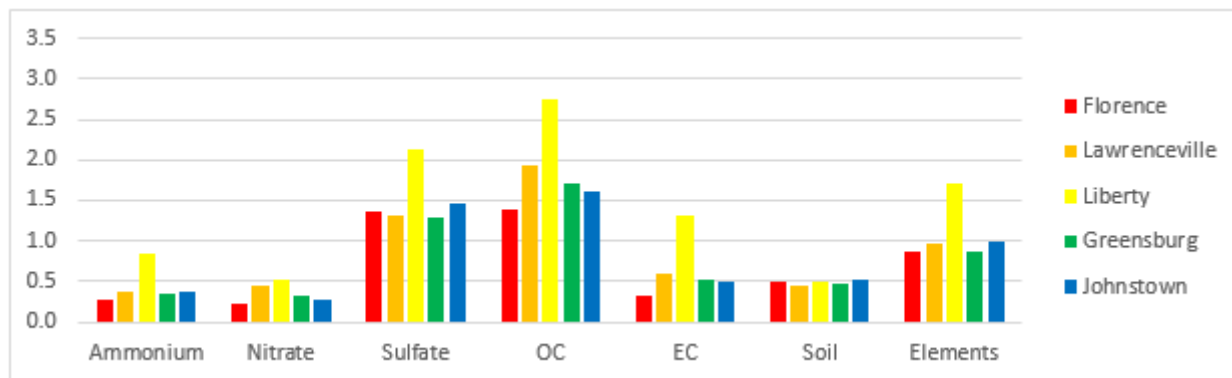
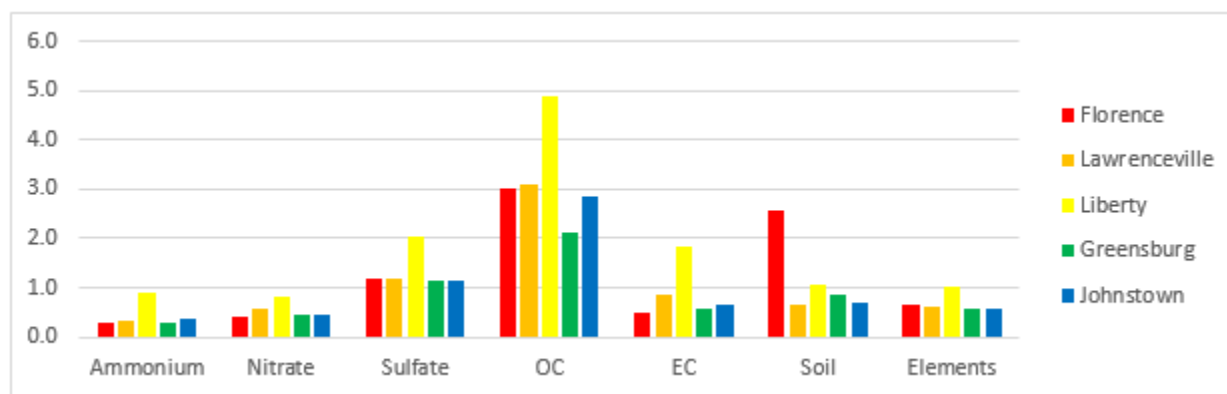


Figure C-1.6.5: 2021-2023 Quarter 2 PM_{2.5} Average Speciation Concentrations (µg/m³)



**Figure C-1.6.6: Comparison of Quarter 2 PM_{2.5} Average Speciation Concentrations(µg/m³)
2021-2023 minus 2016-2018**

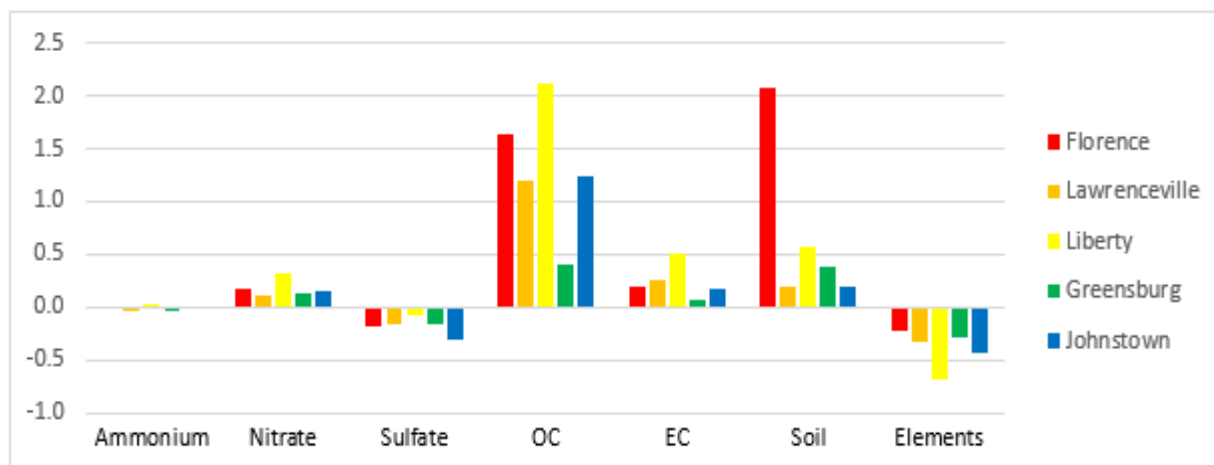


Figure C-1.6.7: 2016-2018 Quarter 3 PM_{2.5} Average Speciation Concentrations (µg/m³)

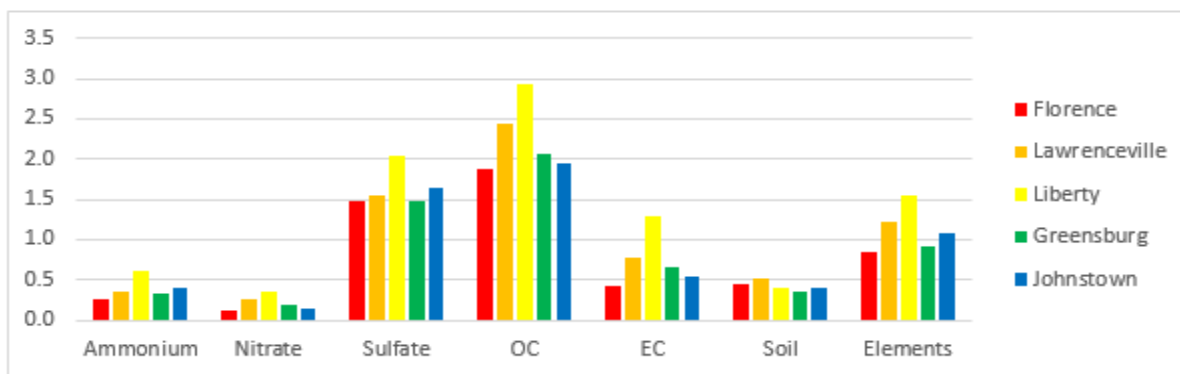
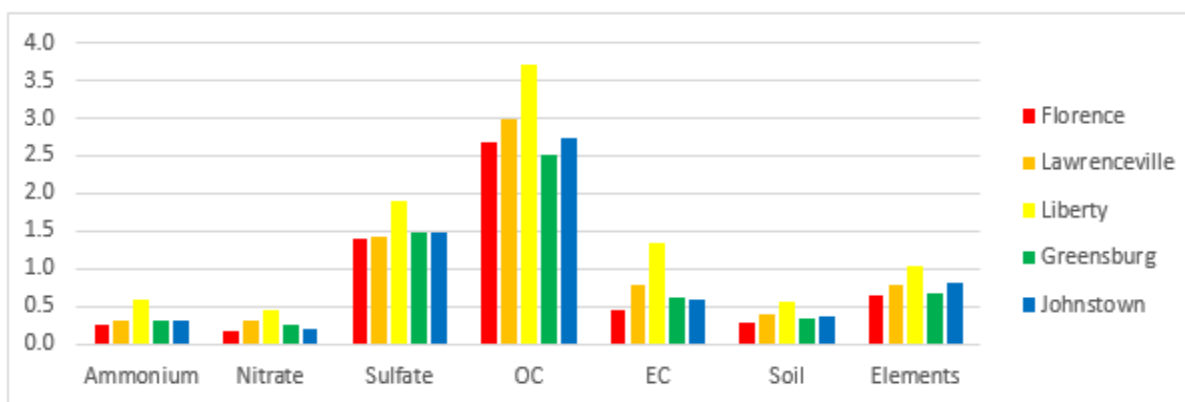


Figure C-1.6.8: 2021-2023 Quarter 3 PM_{2.5} Average Speciation Concentrations (µg/m³)



**Figure C-1.6.9: Comparison of Quarter 3 PM_{2.5} Average Speciation Concentrations(µg/m³)
2021-2023 minus 2016-2018**

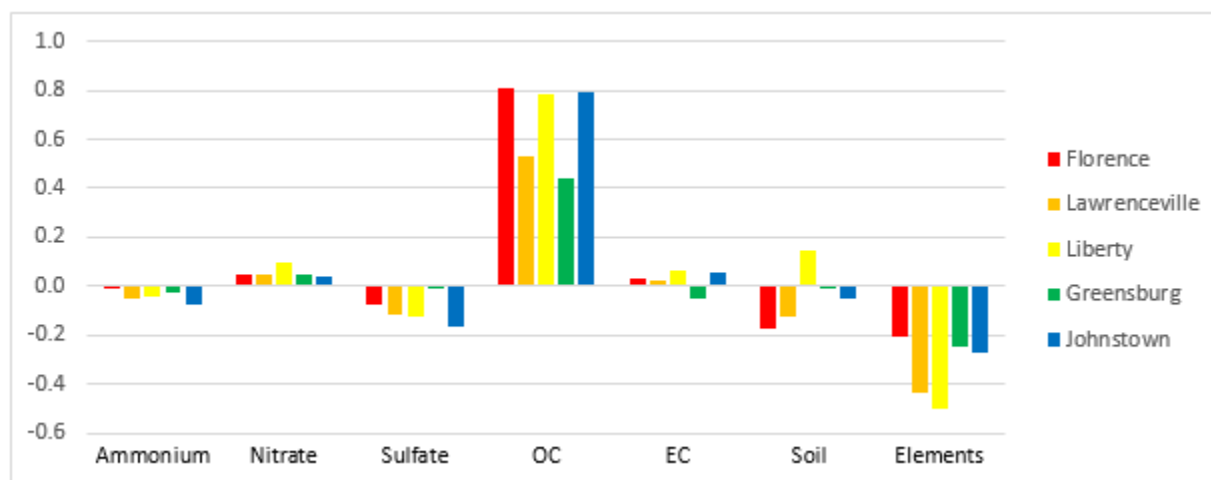


Figure C-1.6.10: 2016-2018 Quarter 4 PM_{2.5} Average Speciation Concentrations (µg/m³)

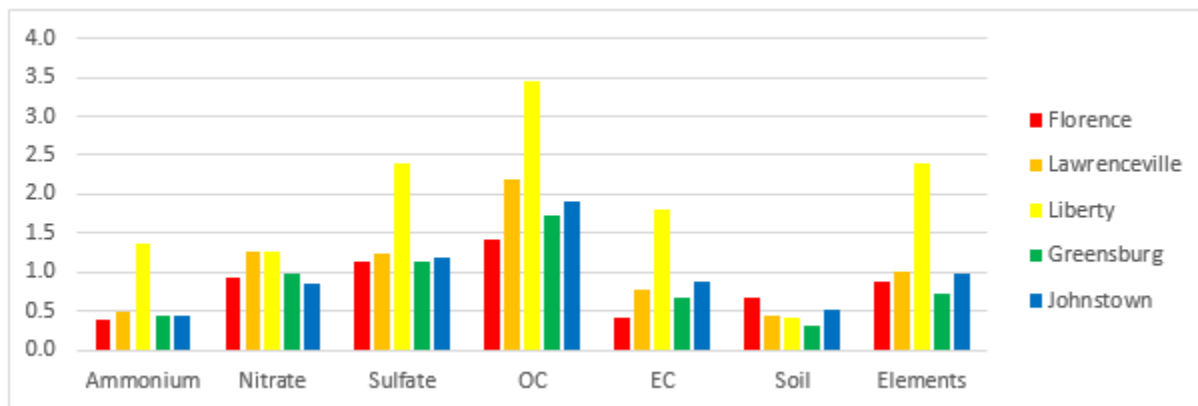


Figure C-1.6.11: 2021-2023 Quarter 4 PM_{2.5} Average Speciation Concentrations (µg/m³)

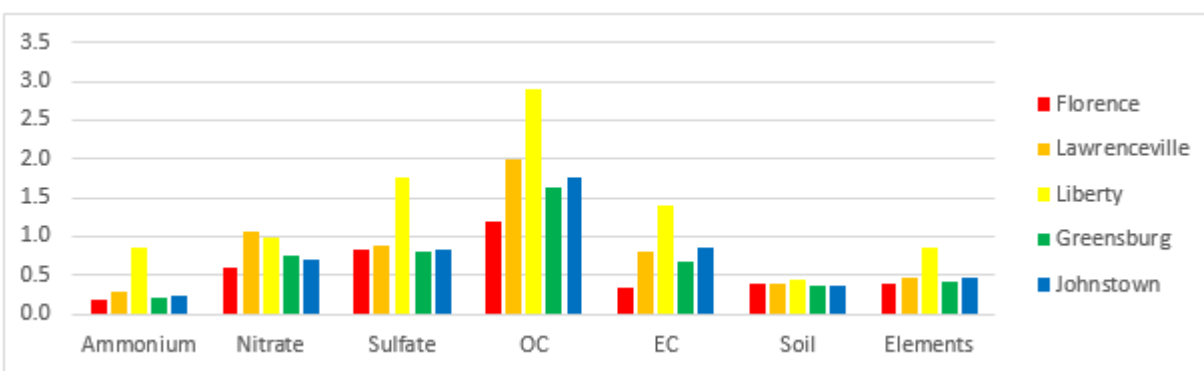
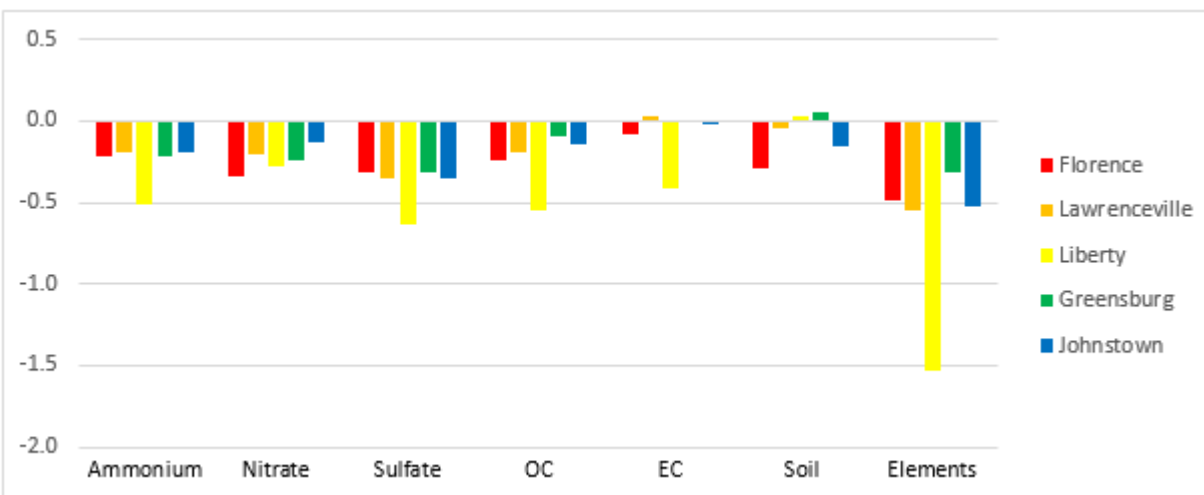


Figure C-1.6.12: Comparison of Quarter 4 PM_{2.5} Average Speciation Concentrations(µg/m³) 2021-2023 minus 2016-2018



During Quarter 1, there have been reductions across the sites in nitrate and ammonium (except at Liberty) with reductions in OC at Florence and Greensburg, reductions in EC at Florence and Lawrenceville, and reductions in soil at Liberty and Greensburg. During Quarter 2, there have been reductions in nitrate, OC, EC, and soil across the sites. During Quarter 3, there have been reductions across the sites in nitrate, OC, and EC (except at Greensburg), and reductions in soil at Liberty. During Quarter 4, there have been reductions in EC at Lawrenceville and reductions in soil at Liberty and Greensburg.

Positive Matrix Factorization (PMF) receptor modeling can be applied to the PM_{2.5} speciation data collected from 2021-2023 to quantify the contribution of sources to the measured PM_{2.5} concentration. This analysis serves as supporting and underlying data for the attainment demonstration in the PM_{2.5} 2024 NAAQS State Implementation Plan (SIP) for the Pennsylvania nonattainment area. Understanding PM_{2.5} sources will help to develop effective emission reduction strategies.

Figure C-1.7.1: PM_{2.5} Urban Excess, Johnstown vs. Florence, 2021-2023 by Quarter

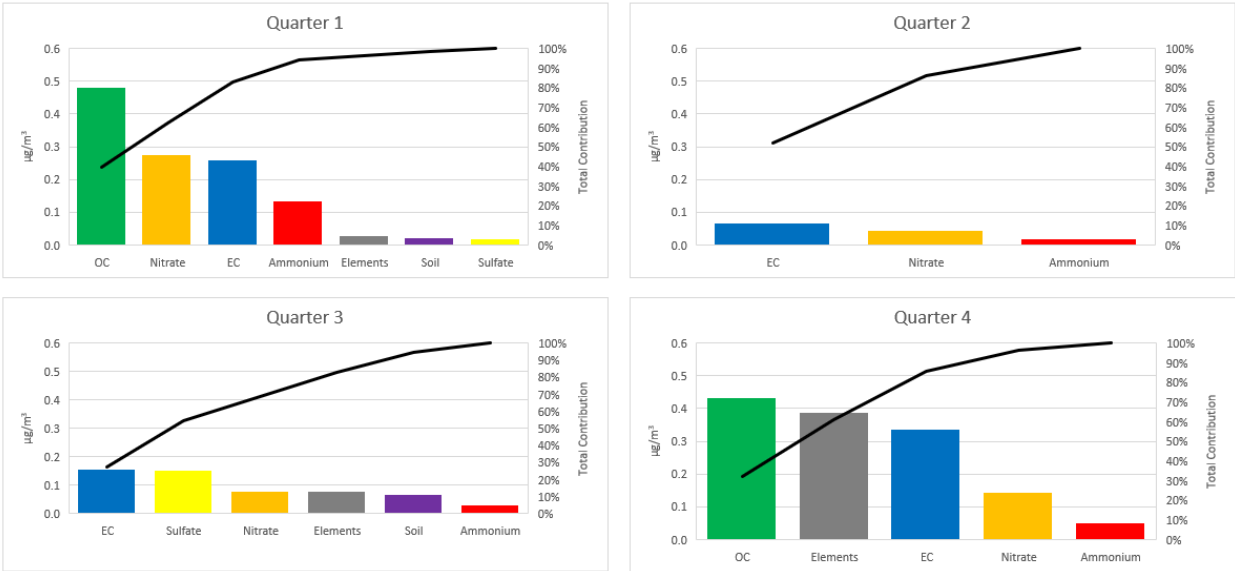


Figure C-1.7.2: PM_{2.5} Urban Excess, Johnstown vs. Florence, 2021-2023

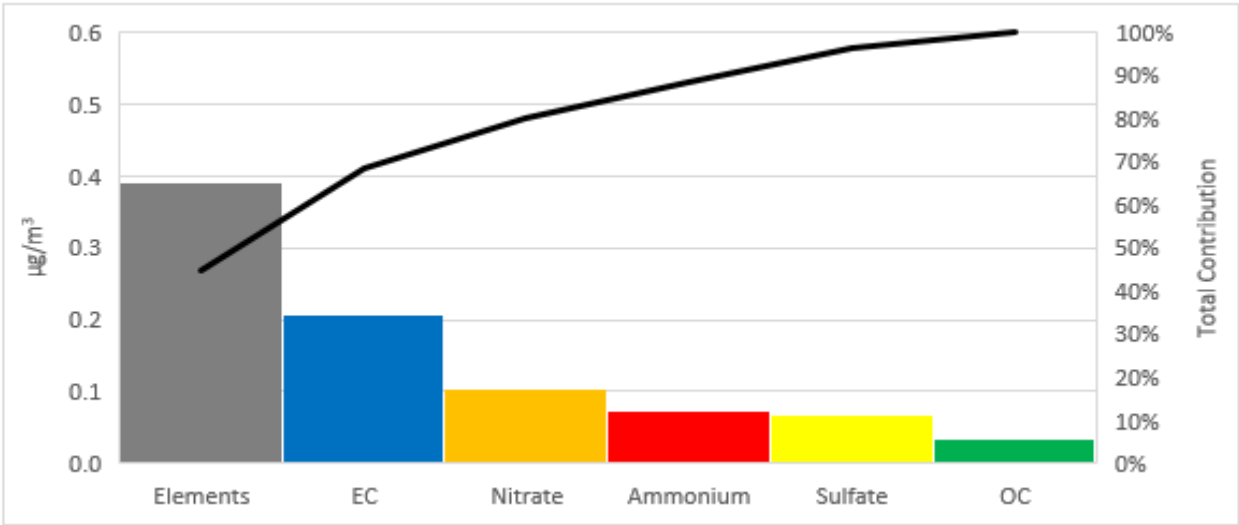


Figure C-1.7.3: PM_{2.5} Urban Excess, Greensburg vs. Florence, 2021-2023 by Quarter

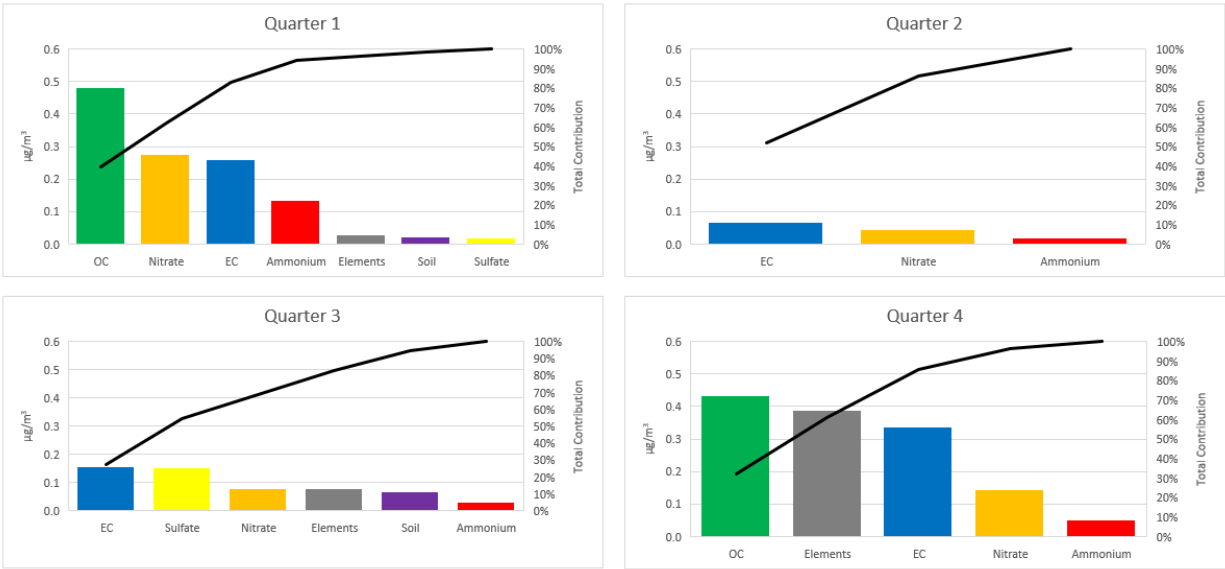


Figure C-1.7.4: PM_{2.5} Urban Excess, Greensburg vs. Florence, 2021-2023

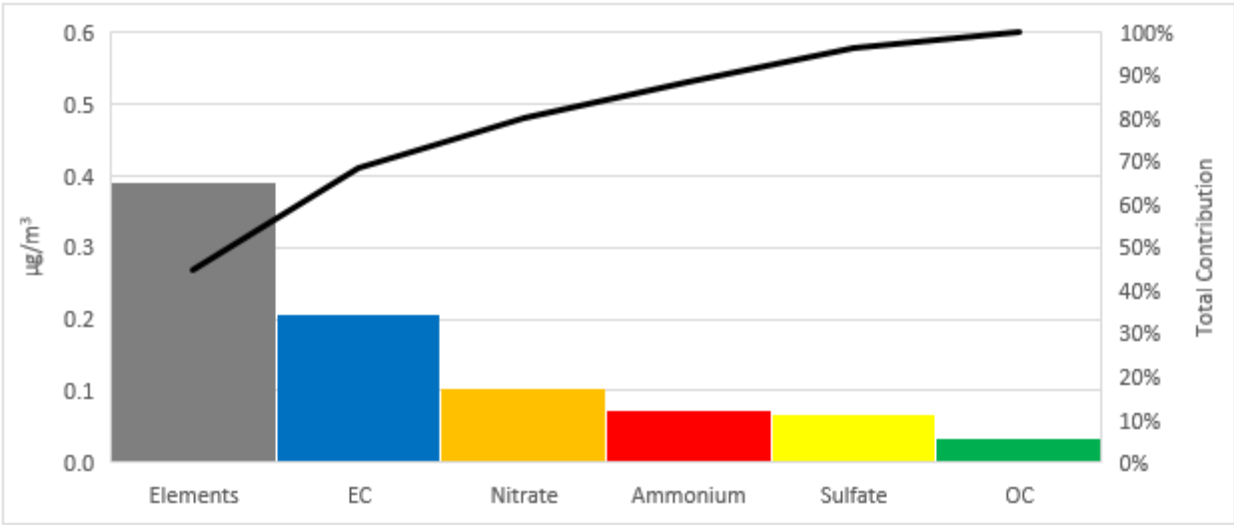


Figure C-1.7.5: PM_{2.5} Urban Excess, Liberty vs. Florence, 2021-2023 by Quarter

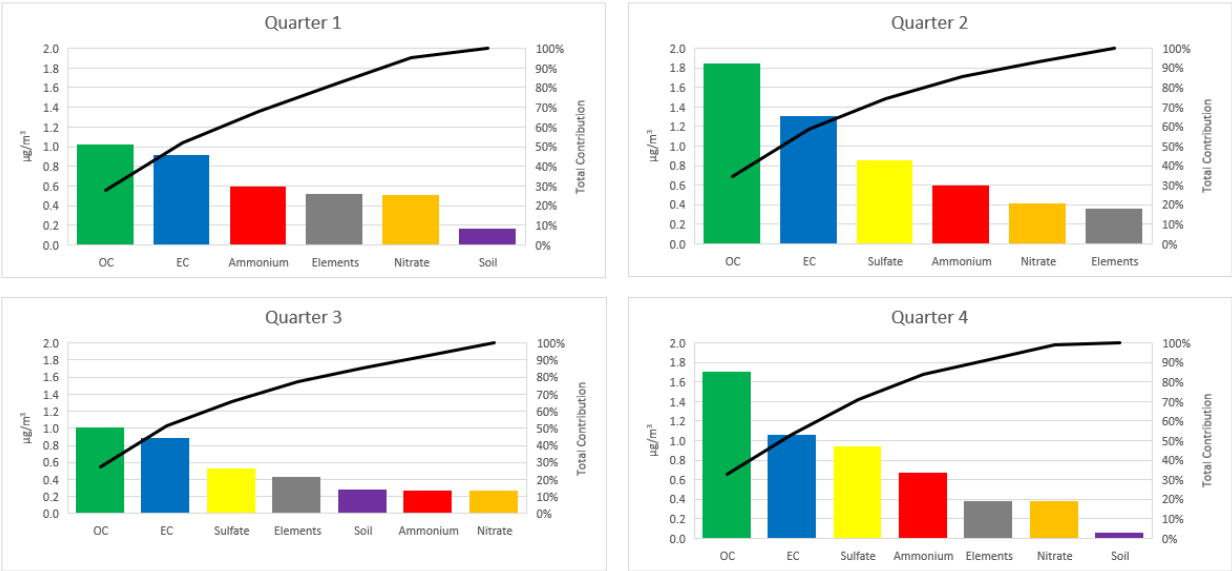


Figure C-1.7.6: PM_{2.5} Urban Excess, Liberty vs. Florence, 2021-2023

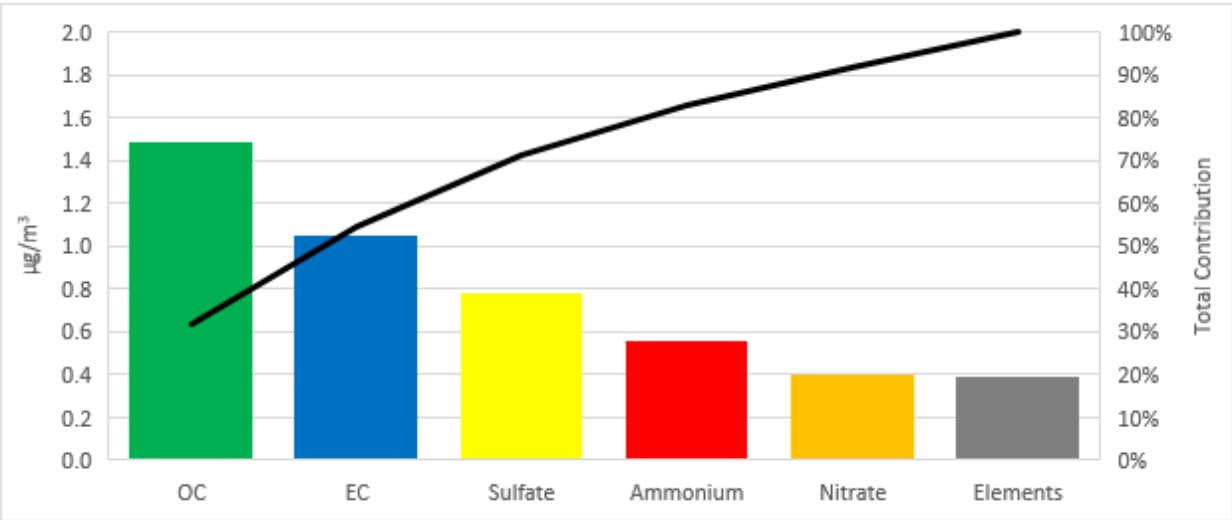


Figure C-1.7.7: PM_{2.5} Urban Excess, Lawrenceville vs. Florence, 2021-2023 by Quarter

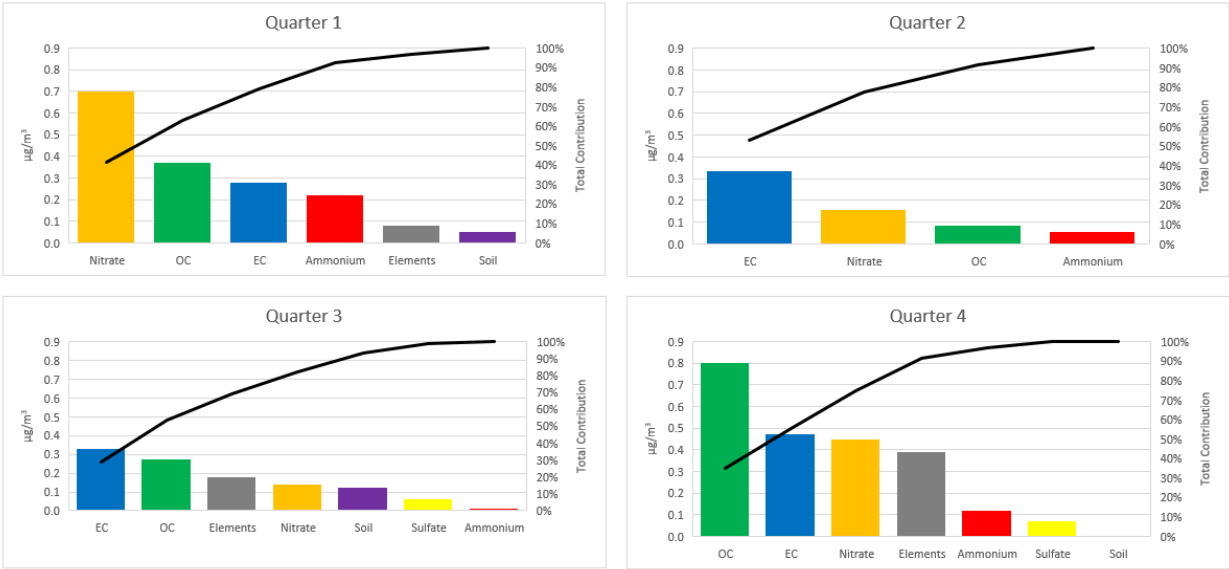
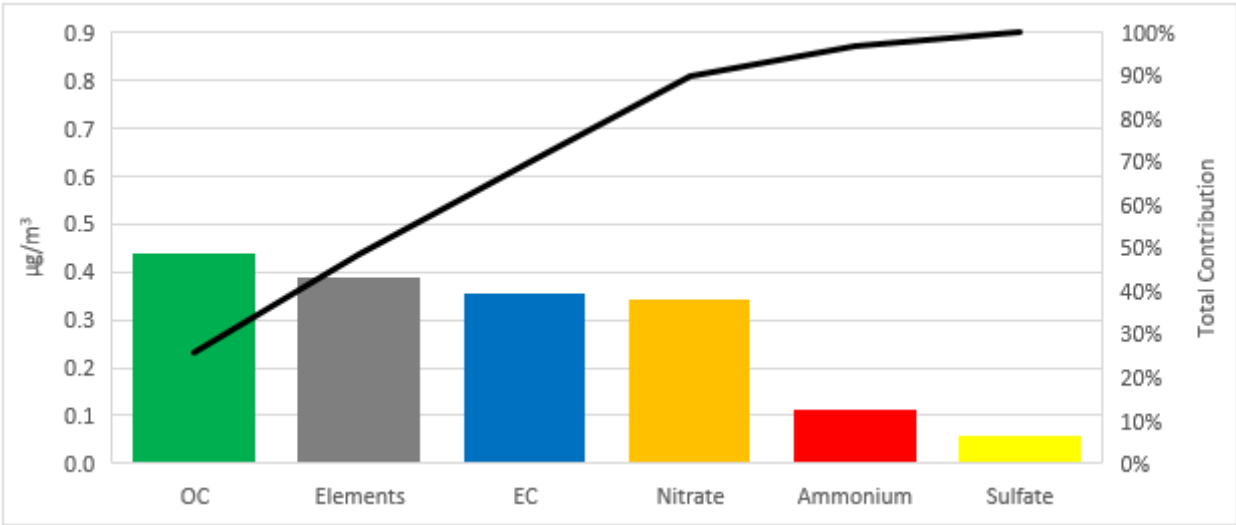


Figure C-1.7.8: PM_{2.5} Urban Excess, Lawrenceville vs. Florence, 2021-2023



Figures C-1.7.1 - C-1.7.8 display the major constituents of PM_{2.5} at the ACHD, Greensburg, and Johnstown monitors compared to Florence. In Quarter 1, all sites have excess ammonium, nitrate, sulfate (except at Liberty and Lawrenceville), OC, EC, soil, and trace elements compared to Florence, suggesting emissions are local in nature. In Quarter 2, Liberty has excess ammonium, nitrate, sulfate, OC, EC, and trace elements compared to Florence, suggesting emissions are local in nature. The remaining sites have excess ammonium, nitrate, and EC compared to Florence and Lawrenceville also has excess OC. In Quarter 3, all sites have excess ammonium, nitrate, sulfate, OC (except at Greensburg and Johnstown), EC, soil, and trace elements compared to Florence, suggesting emissions are local in nature. In Quarter 4, all sites have excess ammonium, nitrate, sulfate (except at Greensburg and Johnstown), OC, EC, soil (except at Greensburg and Johnstown), and trace elements compared to Florence, suggesting emissions are local in nature.

In terms of overall urban (or localized) excess in the Pittsburgh MSA, the Lawrenceville site within Allegheny County shows the highest “urban” excess in the Pittsburgh MSA, with 1.3 µg/m³ of excess species that might be attributed to higher population. The downwind Greensburg site in Westmoreland County (and Johnstown in Cambria County, outside the Pittsburgh MSA) show some increase of compounds but to a lesser extent than Lawrenceville. The Liberty site displays a large “localized” excess within Allegheny County (4.4 µg/m³) that can be attributed to industrial influences, during worst-case meteorological or poor dispersion conditions.

Summary

PADEP's analysis illustrates the need for a single county nonattainment area in southwestern Pennsylvania, consisting of Allegheny County only. An analysis of the PM_{2.5} data monitored at the Liberty, North Braddock, Parkway East, and Avalon monitors in Allegheny County illustrate that these monitors see greater concentrations in the 9-27 µg/m³ range than the regional concentrations in the same range. A further examination into the monitoring data demonstrates that the high concentrations are coming out of the southwest. These wind profiles travel over local point source emissions, further illustrating the local issue at the Liberty, North Braddock, Parkway East, and Avalon monitors. An analysis of the speciated data at the ACHD and Greensburg, Johnstown, and Florence monitors illustrate the excess major constituents of PM_{2.5} emissions to be local in nature. The urban and localized excess is most evident in Allegheny County, which contribute to the violating design values.

The Liberty, North Braddock, Parkway East, and Avalon monitors in Allegheny County have a 2023 annual design value that exceeds the 2024 annual PM_{2.5} NAAQS. The other monitors in the Pittsburgh MSA, namely four monitors in Allegheny County (Lawrenceville, Clairton, Harrison, and South Fayette), two monitors in Washington County (Charlroi and Florence monitors), one monitor in Beaver County (Beaver Falls monitor) and one monitor in Armstrong County (Kittanning monitor) are monitoring attainment of the 2024 standard, are continuing to have a general decline in the annual average, and are not contributing to excess emissions elsewhere. Therefore, PADEP is recommending Allegheny County in the Pittsburgh MSA be designated nonattainment for the 2024 annual PM_{2.5} NAAQS. A map of the proposed nonattainment area is provided below as Figure C-1.8.

Figure C-1.8: Recommended Allegheny County PM_{2.5} Nonattainment Area

