Ambient Air Quality Monitoring Data Review

Cricket Valley Energy Center
Dover, Dutchess County, New York

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
CEMS	Continuous Emissions Monitoring System
CO	carbon monoxide
CVEC	Cricket Valley Energy Center, LLC
FERC	Federal Energy Regulatory Commission
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NYSDEC	New York State Department of Environmental Conservation
NYISO	New York Independent System Operator
PM_{10}	particulate matter with a diameter equal to or less than 10 microns
$PM_{2.5}$	particulate matter with a diameter equal to or less than 2.5 microns
ppm	parts per million
SCR	selective catalytic reduction
SEQR	State Environmental Quality Review Act
SO_2	sulfur dioxide
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds

EXECUTIVE SUMMARY

Cricket Valley Energy Center, LLC et al. (CVEC) operates the 1,100 megawatt (MW) natural gas-fired electric generation facility in the Town of Dover, Dutchess County, New York known as the Cricket Valley Energy Center (the CVEC project). Pursuant to the State Environmental Quality Review Act (SEQR), an ambient air quality and meteorological monitoring station (monitoring station) was established at the Dover High School/Middle School complex "To ensure that air quality within the Town of Dover and Harlem Valley remain in compliance with NAAQS[1]… as a condition of approval of the Special Permit/Site Plan application." This required CVEC to install and operate the monitoring station for a minimum of three years during which time the monitoring station was required to operate for at least one year after the CVEC project commenced operation.

CVEC established the monitoring station on the school complex campus, located approximately 0.7 miles north-northeast of the CVEC project. The monitoring station began performing measurements on December 1, 2017, with subsequent continuous operation, including calibration and maintenance, for over 6 years. The CVEC project commenced commercial operation in April 2020. The monitoring station includes equipment for measuring ambient air concentrations of nitrogen dioxide (NO_2), particulate matter with aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$), and ozone; and for measuring the following meteorological parameters: wind speed, wind direction, ambient temperature, station pressure, and relative humidity. Measurements are recorded at a frequency of every hour, with each measurement representing the average value measured for that hour.

The purpose of the monitoring station is to provide real-time ambient air quality measurements at ground level in a populated area and to assess compliance with the NAAQS which are established by the U.S. Environmental Protection Agency (USEPA) to protect human health and public welfare. The calculation of NAAQS design values (the metric that is used to compare ambient concentration data measured at a site to the NAAQS) involves several steps that include the elimination of high values as well as further averaging of data. Thus, the direct comparison of continuously measured 1-hour values to the NAAQS should only be considered as a screening assessment and not as a compliance assessment.

Analysis of collected data generally confirms the monitoring station is reliably producing ambient air quality concentration measurements and meteorological measurements within expectations and **consistent with measurements historically collected in the vicinity.** Ambient air quality and meteorological measurements collected at the monitoring station demonstrate that the CVEC project is not contributing detectable levels of NO_2 and $PM_{2.5}$. Rather, measured ambient air quality is the result of regional transport from the New York City and Albany metropolitan areas. Elevated $PM_{2.5}$ measurements are also due to the transport of smoke from Canadian wildfires into the area.

[1] National Ambient Air Quality Standards

1.0 BACKGROUND

The CVEC project is connected to the New York state electric grid at a substation located in Dover, NY. CVEC also constructed a 14.5-mile 345 kilovolt transmission line from Dover, NY to Consolidated Edison Company's Pleasant Valley substation. The CVEC project is now part of the New York state electric system administered by the New York Independent System Operator (NYISO) under a tariff approved by the Federal Energy Regulatory Commission (FERC).

The CVEC project incorporates state-of-the-art emissions control technology for nitrogen oxides (NO_X), of which NO_2 is a subset, volatile organic compounds (VOC), and carbon monoxide (CO), including dry low-NO_X burners and selective catalytic reduction (SCR) technology to control NO_X emissions, and an oxidation catalyst to control VOC and CO emissions. These emissions controls were required to be installed as a condition of the rigorous air permitting process required by the New York State Department of Environmental Conservation (NYSDEC). The CVEC project also incorporates a state-of-the-art continuous emissions monitoring system (CEMS) to demonstrate compliance with the stringent emission limits imposed by the NYSDEC-issued air permit and prove the air emissions controls are functioning as expected.

An ambient air quality and meteorological monitoring station was established at the school complex pursuant to the SEQR Findings Statement (Findings Statement) of the Town Board of the Town of Dover for CVEC, which states, "To ensure that air quality within the Town of Dover and Harlem Valley remain in compliance with NAAQS, the weather and air quality monitoring station recommended by Dr. Egan shall be constructed and operated by the Project Sponsor as a condition of approval of the Special Permit/Site Plan application."

The Findings Statement required CVEC to coordinate with the Dover Union Free School District to install the monitor in a location at the Middle/High School campus, to operate the monitoring station for a minimum of three years during which time the monitoring station must operate for at least one year after the CVEC project commenced operation. The purpose of the monitoring station was to provide real-time ambient air quality measurements at ground level in a populated area. Ground level monitoring is important because that is the relevant point of measurement for evaluating impacts to the population located in the vicinity.

CVEC established the monitoring station on the Town of Dover High School/Middle School campus and began performing measurements on December 1, 2017, and has been performing measurements since for a period of over six years, well beyond the timeline required by the SEQR Findings Statement. Unit 1 first combusted fuel on October 19, 2019; Unit 2 first combusted fuel on November 14, 2019; and Unit 3 first combusted fuel on February 23, 2020. The CVEC project commenced commercial operation in April 2020. Measurements during the entire monitoring station operating period are evaluated herein.

2.0 NATIONAL AMBIENT AIR QUALITY STANDARDS

The United States Environmental Protection Agency (USEPA) has NAAQS as required by the Clean Air Act to protect public health and public welfare. Primary NAAQS have been established to protect public health. Secondary NAAQS have been established to protect public welfare. NAAQS have been established for six "criteria pollutants": carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. There are two categories of particulate matter: PM_{10} includes all particulate matter less than or equal to 10 microns; $PM_{2.5}$ includes all particulate matter less than or equal to 2.5 microns.

Concentrations of NO_2, CO, and SO_2 primarily come from burning fossil fuels through internal combustion engines in cars, trucks, off-road vehicles, construction equipment, and industrial facilities. Particulate matter can be emitted directly from a source (primary) or through atmospheric chemical reactions (secondary) of gases such as NO_X and SO_2. Common sources of particulate matter include smoke, dust, and fumes from vehicles, power generation, industrial facilities, construction sites, wildfires, roads, and agricultural activities. Ground-level ozone, otherwise known as "smog," forms in the atmosphere from reactions between VOC and NO_X under high temperatures and in the presence of sunlight. Therefore, elevated ground-level ozone levels are often observed during the summer months. Since the removal of lead from fuel, the presence of the pollutant in ambient air has decreased significantly and is of little concern outside of metal processing, lead smelters, and some industrial facilities.

The NAAQS are reviewed and revised periodically as more becomes understood about the pollutants and their impacts to public health. For example, in February 2024, the USEPA finalized a rule change reducing the primary annual $PM_{2.5}$ NAAQS from 12.0 μg/m^3 to 9.0 μg/m^3. The current NAAQS for all criteria pollutants are listed in Table 1.

Table 1. National Ambient Air Quality Standards

Pollutant	Averaging Time	Level		Form
		Primary	Secondary	
Carbon Monoxide	1 hour	35 ppm	N/A	Not to be exceeded more than once per year
	8 hours	9 ppm	N/A	
Lead	Rolling 3-month average	0.15 μg/m^3	0.15 μg/m^3	Not to be exceeded
Nitrogen Dioxide	1 hour	100 ppb	N/A	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	1 year	53 ppb	53 ppb	Annual mean
Ozone	8 hours	0.070 ppm	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter - $PM_{2.5}$	24 hours	35 μg/m^3	35 μg/m^3	98th percentile, averaged over 3 years
	Annual	9.0 μg/m^3	15.0 μg/m^3	Annual mean, averaged over 3 years
Particulate Matter - PM_{10}	24 hours	150 μg/m^3	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide	1 hour	75 ppb	N/A	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	3 hours	N/A	0.5 ppm	Not to be exceeded more than once per year

All combustion equipment produce emissions of NO_2 and $PM_{2.5}$. Combustion equipment does not directly produce emissions of ozone, but it does produce emissions of ozone precursor pollutants.

As shown in Table 1, two NAAQS have been established for NO_2, one based on an averaging period of one hour with a primary standard of 100 ppb and one based on an averaging period of one year with a primary and secondary standard of 53 ppb; three NAAQS have been established for $PM_{2.5}$, two based on an averaging period of one year (with a primary standard of 9.0 µg/m^3 and a secondary standard of 15.0 µg/m^3) and the other based on an averaging period of 24 hours with a primary and secondary standard of 35 µg/m^3; a single NAAQS has been established for ozone and is based on an averaging period of 8 hours with a primary and secondary standard of 70 ppb.

The form of the NAAQS shows how to evaluate an averaged pollutant concentration value. For short-term averages, this can be complex with several steps needed to be performed. The resulting value from the calculation is known as a “design value.”

For example, the 1-hour NO_2 NAAQS is written as the “98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.” To calculate the design value: First, find the 1-hour daily maximum concentration for each day by recording the 24 1-hour measurements and keeping the highest measured value (discard the other 23); do this for all 365 days in the year. Next, find the 98th percentile for that year by finding the value for which at least 98% of the 1-hour daily maximum concentrations will be less than that value (i.e., discard the highest 7 values and retain the 8th highest value); do this for three years. Lastly, take the 98th percentiles for the three years and average them to obtain the design value.

Similarly, the 24-hour $PM_{2.5}$ NAAQS is written as “the 98th percentile (of the 24-hour average concentrations) averaged over 3 years”. To calculate the design value: First, find the daily average concentration for each day by recording the 24 1-hour measurements and taking the average; do this for all 365 days in the year. Next, find the 98th percentile for that year by finding the value for which at least 98% of the daily average concentrations will be less than that value (i.e., discard the highest 7 values and retain the 8th highest value); do this for three years. Lastly, take the 98th percentiles for the three years and average them to obtain the design value.

For ozone, the NAAQS is written as the “annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years”. To calculate the design value: First, find the daily maximum 8-hour concentration by recording the three 8-hour measurements and keeping the highest measured value (discard the other two); do this for 365 days in the year. Next, find the fourth-highest value for that year (i.e., discard the highest 3 values and retain the 4th highest value); do this for 3 years. Lastly, take the fourth-highest values for the three years and average them to obtain the design value.

As shown above, the calculation of NAAQS design values involves several steps that include the elimination of high values as well as further averaging of multiple years of data. Further, the relevant NAAQS averaging periods for $PM_{2.5}$ and ozone are 24 hours and 8 hours, respectively, not 1 hour. Thus, the direct comparison of continuously measured 1-hour values to the NAAQS should only be considered as a screening assessment and not as a compliance assessment. With that said, if all measured 1-hour average values are less than the numeric limit, then the monitoring site is clearly in compliance with the NAAQS because any further data processing will result in a calculated design value that is also less than the NAAQS. The comparison of actual measured values to the NAAQS should only be considered as a screening assessment.

3.0 MONITORING STATION

3.1 LOCATION

Figure 1 is an aerial image showing the location of the monitoring station within the Dover High School/Middle School complex. Figure 2 is an aerial image that shows the location of the monitoring station in relation to the CVEC project.

Wind directions blowing from the south-southwest toward the north-northeast would be the most likely to transport emissions from the CVEC project to the monitoring station. Figure 3 is a topographic image showing this wind direction and sector. The monitoring station is also located north-northeast of the New York City metropolitan area. Wind directions blowing from southerly directions would be the most likely to transport NO_2, $PM_{2.5}$, and ozone from the New York City metropolitan area to the monitoring station. Figure 4 is a topographic image showing that the same wind direction that would transport emissions from the CVEC project to the monitoring station would likely include regional transport of pollutants from highly urbanized areas, with topography also playing a role.

3.2 EQUIPMENT AND MEASURED PARAMETERS

The monitoring station includes equipment for measuring ambient concentrations of NO_2, $PM_{2.5}$, and ozone, and for measuring wind speed, wind direction, ambient temperature, station pressure, and relative humidity. Measurements are recorded at a frequency of every hour, with each measurement representing the average value measured for that hour.

All combustion equipment at CVEC produce NO_X emissions which is predominantly comprised of nitric oxide (NO) and NO_2. Atmospheric chemistry converts NO to NO_2. Reaction kinetics, plume dispersion, and presence of ozone dictate the conversion rate. NO_2 concentrations greater than background levels measured at the monitoring station are expected to represent the transport of NO_2 emissions from local sources including motor vehicles, and residential, commercial, and industrial establishments located nearby. Regional transport of NO_2 into the Town of Dover from distant urbanized areas such as New York City can also be expected.

All combustion equipment at CVEC produce primary $PM_{2.5}$ emissions. All combustion equipment at CVEC also produce $PM_{2.5}$ precursor emissions, specifically NO_X, SO_2, ammonia (NH_3), and VOC, which can result in the formation of secondary $PM_{2.5}$. $PM_{2.5}$ concentrations greater than background levels measured at the monitoring station are expected to represent both the regional transport of primary and secondary $PM_{2.5}$ into the Town of Dover from distant urbanized areas such as New York City and the transport of primary $PM_{2.5}$ from local sources.

CVEC does not produce ozone emissions. Ozone forms in the atmosphere from reactions between NO_X and VOC in the presence of sunlight (NO_X and VOC are ozone precursors). Due to the nature of precursor emissions and their atmospheric chemistry, ozone is regarded as a regional pollutant. Ozone concentrations greater than background levels measured at the monitoring station are expected to represent the regional transport of ozone into the Town of Dover from distant urbanized areas such as New York City, and not from local emissions sources such as CVEC.

The concurrent meteorological measurements (wind direction in particular) can be used to discern the emissions sources that are contributing to ambient air concentrations greater than background levels. For example, they can be used to discern if a CVEC contribution exists or if measurements are more likely the result of regional transport. Other observations, such as concurrent ambient air concentrations of NO_2 and $PM_{2.5}$, can also be used to identify the contribution of a local source (i.e., a local combustion source would be expected to contribute to both NO_2 and $PM_{2.5}$ concentrations at the same time).

CVEC purchased the monitoring station equipment from AEROQUAL and has contracted them to perform maintenance and calibration of the monitoring station equipment on a quarterly basis and at other times as needed. AEROQUAL has performed the contracted maintenance and calibration of the monitoring station, so the monitoring station is operating in accordance with manufacturer specifications.

4.0 MONITORING STATION

The monitoring station began performing measurements on December 1, 2017, prior to the CVEC project commencing operation. For simplicity of aligning data to calendar years, data presented herein begins January 1, 2018. Analysis of collected data generally confirms the station is performing as expected. The ambient air quality and meteorological data collected to date are consistent with measurements historically collected in the vicinity.

4.1 TIME SERIES PLOTS OF MEASURED PARAMETERS

A set of time series plots and boxplots are presented to display the parameter measurements over time and to identify whether seasonal and diurnal patterns exist. Major vertical gridlines along the x-axis are set to one-year intervals marked at January 1 of each year and minor vertical gridlines are set to 3-month intervals marked at April 1, July 1, and October 1 of each year. For the ambient air concentration plots, green vertical lines indicate sensor changes that took place on an as-needed basis for the monitoring station's maintenance and black vertical lines marking the dates of first firing for each of the three units. Unit 1 first combusted fuel on October 19, 2019; Unit 2 first combusted fuel on November 14, 2019; and Unit 3 first combusted fuel on February 23, 2020. The CVEC project commenced full commercial operation in April 2020.

4.1.1 Meteorological Measurements

Figures 5 through 9 show time series plots of measured 1-hour average temperature, wind speed, wind direction, barometric pressure, and relative humidity.

Short gaps in data and zero values in the time series plots representing temperature (Figure 5) and wind speeds (Figure 6) can be seen infrequently and may indicate sensor adjustments made during those periods. The ambient temperature and wind speed plots otherwise show consistent patterns indicating good station performance, including seasonal and diurnal patterns that are reasonable for Dover, NY.

The time series plot showing wind direction (Figure 7) is presented as a scatter plot so that prominent wind directions are clearly visible. As indicated by the dark areas of the graph, prominent wind directions occur from 120°-170° (southeast) and 270°-360° (northwest). As shown in Figure 3 above, the CVEC project is located at 208° (southwest) from the monitor, from where winds are less frequent. The scatterplot shows consistent patterns indicating good station performance for wind direction.

The time series plot representing barometric pressure (Figure 8) shows a period of measurements that are not representative of the expected range, indicating issues experienced with the sensor during the last half of 2022 and early 2023. The plot otherwise shows consistent patterns indicating good station performance, including seasonal patterns that are reasonable for Dover, NY.

The time series plot representing relative humidity (Figure 9) shows consistent patterns throughout the record of measurement, including diurnal patterns that are reasonable for Dover, NY.

4.1.2 Ambient Air Quality Measurements

The attached Figures 10 through 20 show time series plots and box plots of measured ambient air concentrations of NO_2, $PM_{2.5}$, and ozone.

The ambient air quality data collected to date are consistent with measurements historically collected in the vicinity. Across all pollutant measurements, both seasonal and diurnal cycles appear to be reasonable. Short gaps in data and zero values can be seen infrequently and may indicate sensor adjustments made during maintenance. However, the data show fairly consistent patterns indicating good station performance.

4.1.2.1 NO_2

As shown in Figures 10 and 11, measurements of ambient air concentrations of NO_2 are less than the relevant 1-hour average and annual average NAAQS. The box plot presented in Figure 12 shows that the highest measured NO_2 concentrations tend to be greatest at night, which may occur due to the more stable atmospheric conditions during the nighttime hours. Additionally, during the day, atmospheric NO_2 is likely scavenged in atmospheric chemical reactions to form ozone and secondary $PM_{2.5}$. The box plot presented in Figure 13 shows that the highest measured NO_2 concentrations tend to be greatest in the winter months. Again, atmospheric NO_2 is likely scavenged more effectively in the summer when sunlight is available to form ozone and secondary $PM_{2.5}$.

4.1.2.2 $PM_{2.5}$

Figure 14 shows that measurements of 24-hour average ambient air concentrations of $PM_{2.5}$ are infrequently greater than the value of the 24-hour NAAQS. In contrast, Figure 15 shows that measurements of annual average ambient air concentrations of $PM_{2.5}$ are less than the relevant NAAQS, which was recently made more stringent by USEPA.

The highest measured 24-hour rolling average ambient $PM_{2.5}$ concentrations exceeded 35 $\mu g/m^3$ on two general occasions in July 2021 and June-July 2023. Data were compared to measurements taken at the nearest Federal Reference Method (FRM) monitors located nearby in Connecticut, which confirmed that the exceedances were related to regional events that affected several monitors in the area. Further investigation revealed these to be exceptional events related to smoke produced by wildfires in Canada. While these exceptional events impact annual rolling average concentrations as well, all measurements are less than the recently promulgated annual NAAQS of 9.0 ug/m^3.

The box plot presented in Figure 16 shows that the highest measured 1-hour average $PM_{2.5}$ concentrations tend to be greatest in the evening and late afternoon, which may occur as the result of atmospheric transport from the New York City metropolitan area at that time of day and due to more stable atmospheric conditions during the evening hours. The box plot presented in Figure 17 shows that the highest measured 1-hour average $PM_{2.5}$ concentrations tend to be greatest in late winter / early spring and in early summer months. The elevated concentrations in late winter / early spring may be due to more favorable transport conditions from the New York City metropolitan area. Those in the early summer are likely attributable to the exceptional events associated with smoke from the Canadian wildfires.

4.1.2.3 Ozone

As noted previously, ozone is not emitted directly by the CVEC project and therefore measurements are indicative of regional transport from urban areas. Figure 18 shows that measurements of 8-hour average ambient air concentrations of ozone are infrequently greater than the value of the NAAQS and are indicative of the transport of elevated ozone concentrations from the New York City metropolitan area (see further discussion in Section 5.2 below).

The box plot presented in Figure 19 shows that the highest measured 1-hour average ozone concentrations tend to be greatest in the late afternoon, which likely occur as the result of atmospheric transport from the New York City metropolitan area at that time of day (similar to that observed for $PM_{2.5}$). The box plot presented in Figure 20 shows that the highest measured 1-hour average ozone concentrations tend to be greatest in the “ozone season” months ranging from April through August. This is indicative of the contribution of sunlight to the atmospheric chemical reactions that form ozone.

4.2 MULTI-PARAMETER PLOTS

The multi-parameter plots pair measured ambient air concentrations with measured meteorological as well as pair measured ambient air concentrations of NO_2 with those for $PM_{2.5}$. The purpose of these plots is to assess whether CVEC is detectably contributing to the ambient air concentrations being measured at the monitoring station and assess the potential for contributions resulting from the regional transport of air pollutants from other locations such as the New York City metropolitan area.

4.2.1 Simultaneous Measurements of 1-Hour Average Ambient Air Concentrations of NO_2 and $PM_{2.5}$

Figure 21 shows a scatterplot of simultaneously measured 1-hour average ambient air concentrations of NO_2 and $PM_{2.5}$, demonstrating that NO_2 and $PM_{2.5}$ are not elevated at the same time, providing strong evidence that they are not from a common emissions source such as CVEC. The scatterplot provides additional information on whether the simultaneous measurements were associated with south-southwest (SSW) winds (i.e., those wind directions that would be associated with transport from the CVEC project) both before first fire (green dots) and after first fire (orange dots). All other data are presented with gray dots. The overall pattern of the scatterplot is consistent regardless of wind direction and regardless of whether the CVEC project was operating.

More specifically, the highest measured 1-hour average ambient NO_2 concentrations were greater than 80 ppb only three (3) times out of the more than 40,000 hours that have passed since the CVEC project commenced operation with Unit 1 first combusting fuel on October 19, 2019. The simultaneous measurements of ambient 1-hour average $PM_{2.5}$ concentrations were at background levels. Similarly, during all hours when 1-hour average $PM_{2.5}$ concentrations were greater than 35 ug/m^3, the simultaneous measurements of ambient 1-hour average NO_2 were at background levels.

Based on review of the scatterplot, it is clear that the CVEC project is not contributing detectable impacts at the monitor. The simultaneous measurements of NO_2 and $PM_{2.5}$ show no discernable difference before and after first fire. Furthermore, relatively elevated measurements of each pollutant occur independently of each other, further indicating there is no other local source that is contributing detectable impacts at the monitor.

4.2.2 Simultaneous Measurements of 1-Hour Average Ambient Air Concentrations and Wind Direction

Analysis of concurrent 1-hour average wind direction and ambient air concentration measurements was performed to assess the potential origin of the pollutants, considering the assessment of concurrent NO_2 and $PM_{2.5}$ measurements concluded that no local sources are contributing to detectable impacts at the monitor. This assessment confirms the finding and additionally provides insight into other possible origins.

Boxplots of 1-hour average ambient air concentration and simultaneous 1-hour average wind direction are presented in Figures 22 through 24. Conclusions for each pollutant are as follows:

- For NO_2, in all three cases when the measured ambient air concentration was greater than 80 ppb, the wind directions were from the east and east-southeast. These factors indicate that the CVEC project did not contribute to these three (3) measured ambient 1-hour average NO_2 concentrations above 80 ppb. The boxplot further suggests these measurements were outliers. Excepting these three observations, the highest ambient air NO_2 concentrations are generally from the southern quadrant, suggesting regional transport from the New York City metropolitan area. A northerly contribution is also notable, suggesting regional transport from the Albany metropolitan area.

- For $PM_{2.5}$, the boxplot indicates the highest 1-hour average ambient air concentrations occur most frequently from the southern quadrant, suggesting regional transport from the New York City metropolitan area. A northwesterly contribution is also frequently observed, suggesting regional transport from the Albany metropolitan area as well as from smoke associated with Canadian wildfires. Elevated ambient air concentrations are also associated with all other wind directions, albeit with less frequency than the southern and northwesterly quadrants.
- For ozone, the highest ambient air ozone concentrations are generally from the southern quadrant, suggesting regional transport from the New York City metropolitan area. A northerly contribution is also notable, suggesting regional transport from the Albany metropolitan area.

Combined with the scatterplot, the analysis of simultaneous ambient air concentrations and wind direction provide further evidence that CVEC and other local sources are not detectably contributing to ambient air quality measurements at the monitoring station. Rather, this analysis indicates that regional transport of air pollutants is the primary contributor.

4.2.3 Simultaneous Measurements of 1-Hour Average Ambient Air Concentrations and Wind Speed

Figure 25 is a scatterplot of NO_2 and $PM_{2.5}$ concentrations at different wind speeds, showing that elevated ambient air concentrations of both pollutants tend to occur during periods of relatively low wind speeds. This observation is consistent with air pollution transport principles. Lower wind speeds are frequently associated with more stable atmospheric conditions which result in lower plume dispersion and consequently higher ambient air concentrations. Higher wind speeds are responsible for greater plume dispersion, resulting in lower ambient air concentrations.

5.0 CONCLUSIONS

The Dover High School/Middle School ambient air quality monitoring station is reliably producing ambient air quality concentration and meteorological measurements within expectations. Ambient air quality and meteorological measurements collected at the monitoring station demonstrate that the CVEC project is not contributing detectable levels of NO_2 and $PM_{2.5}$. Rather, measured ambient air quality is the result of regional transport from the New York City and Albany metropolitan areas. Elevated $PM_{2.5}$ measurements are also due to the transport of smoke from Canadian wildfires into the area.

FIGURES

Figure 1. Monitor Location

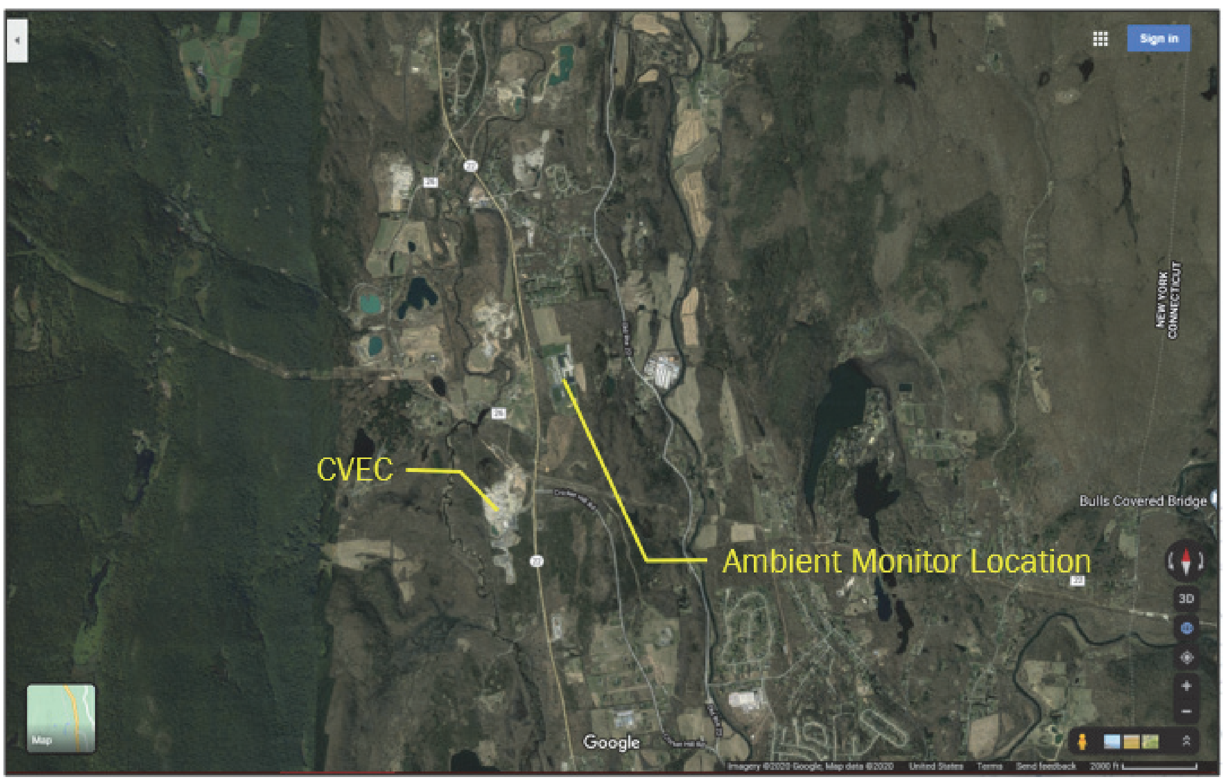

Figure 2. Local Setting (Aerial)

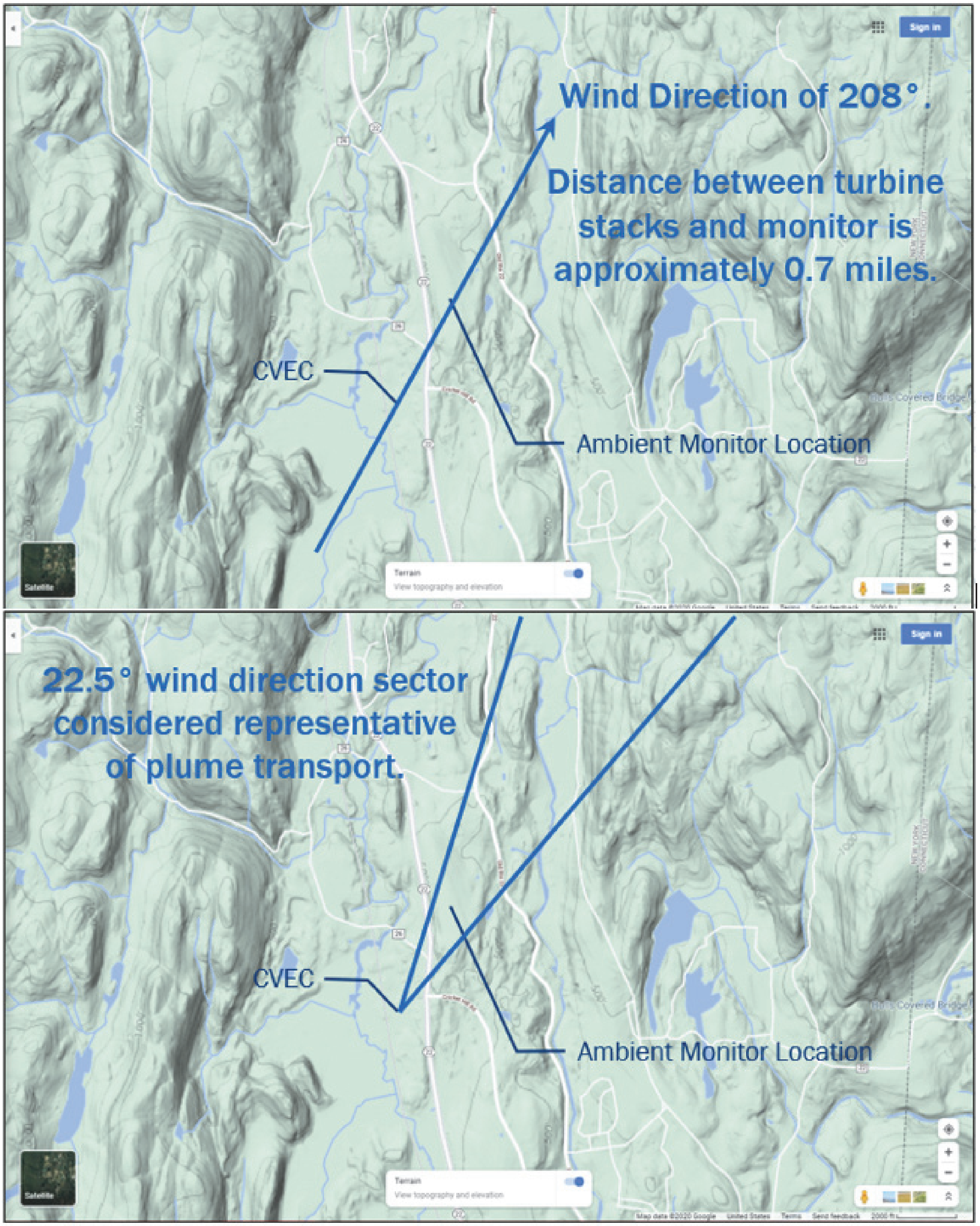

Figure 3. Local Setting (Topographic)

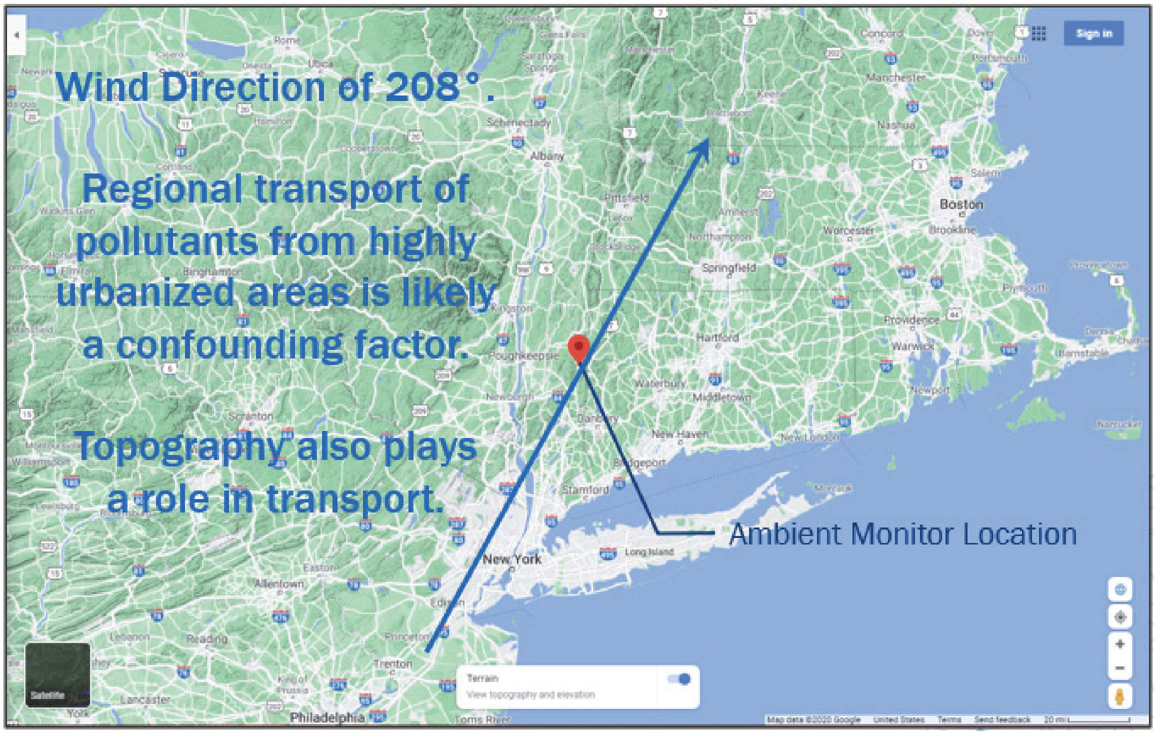

Figure 4. Regional Setting (Topographic)

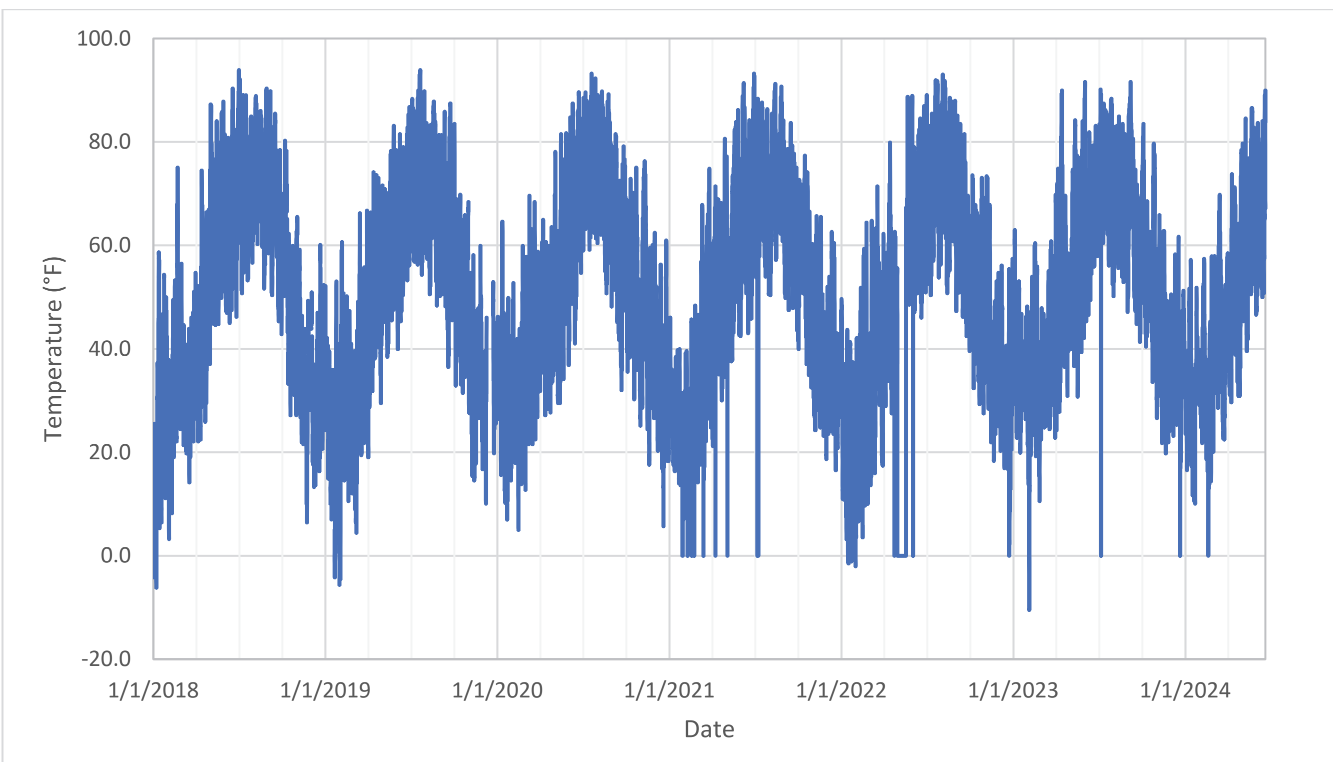

Figure 5. Time Series Plot of Measured Ambient 1-Hour Average Temperature

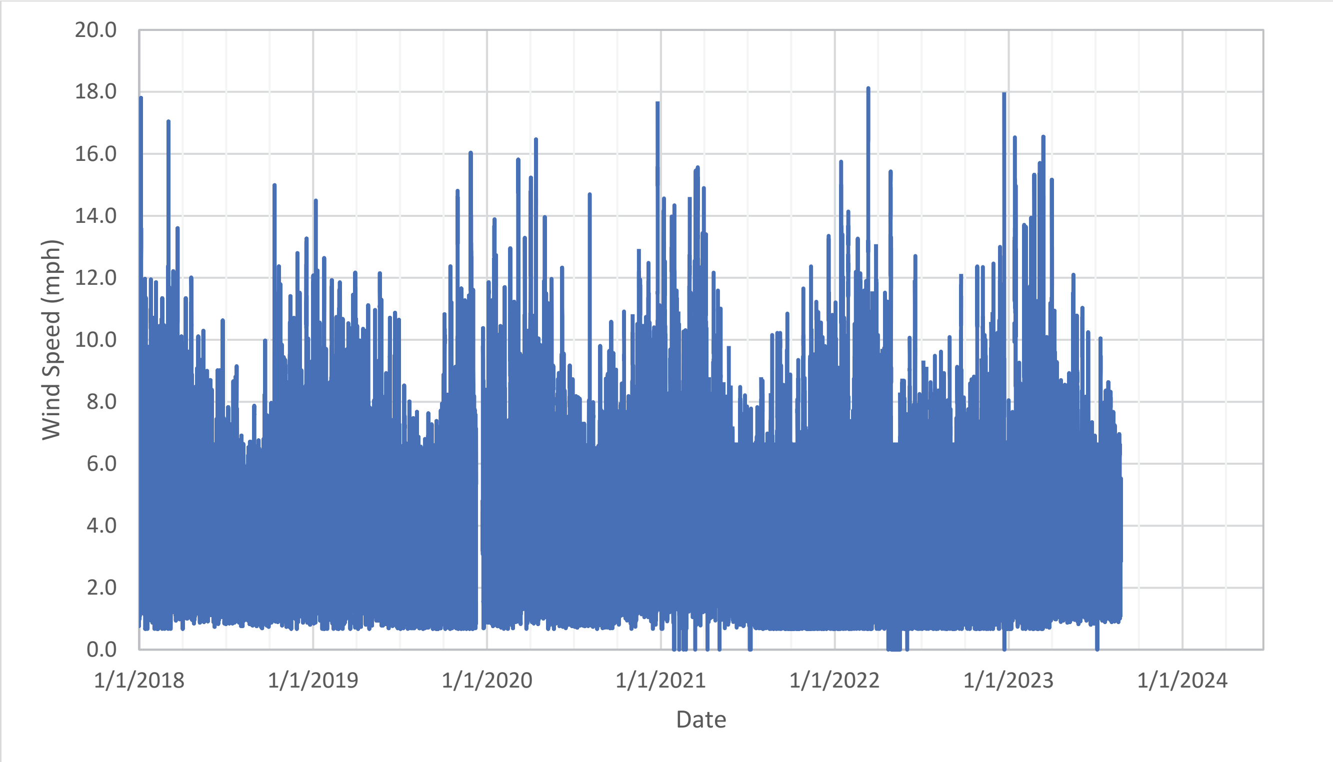

Figure 6. Time Series Plot of Measured Ambient 1-Hour Average Wind Speed

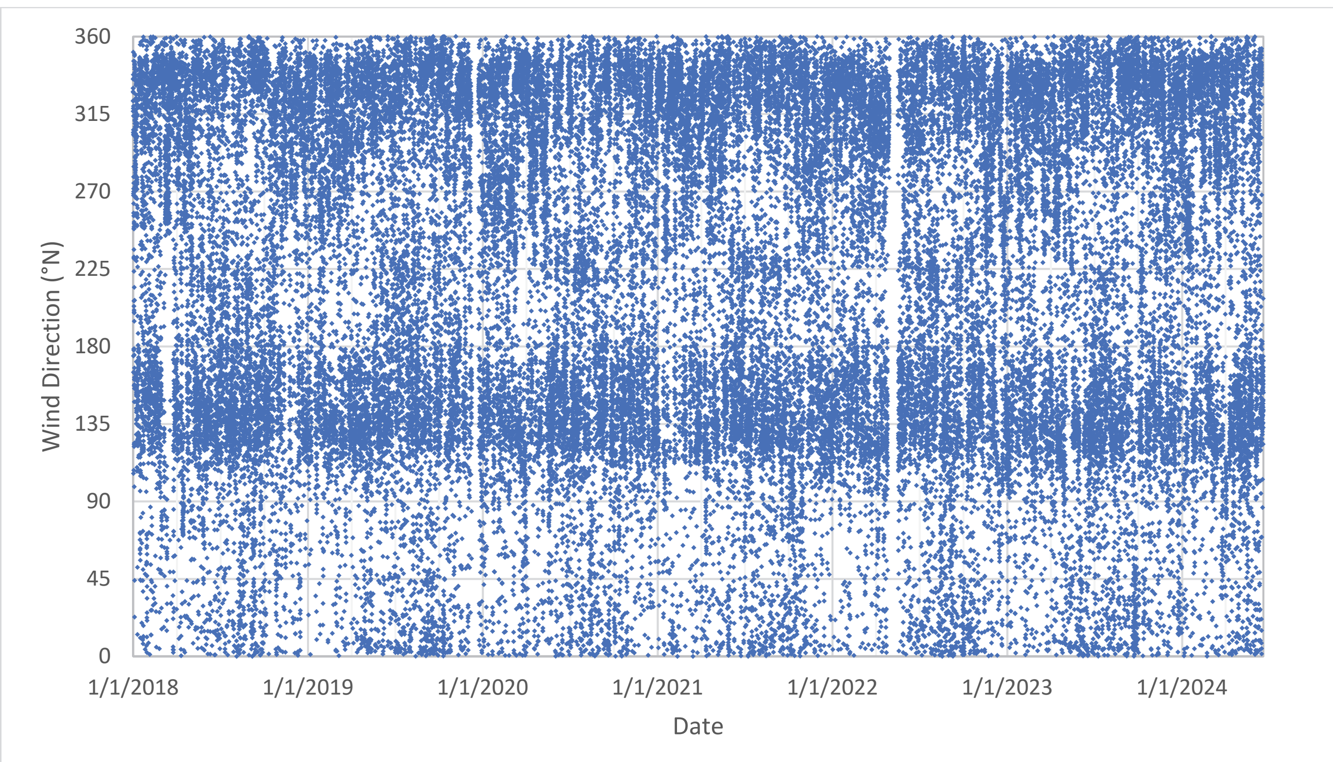

Figure 7. Time Series Plot of Measured Ambient 1-Hour Average Wind Direction

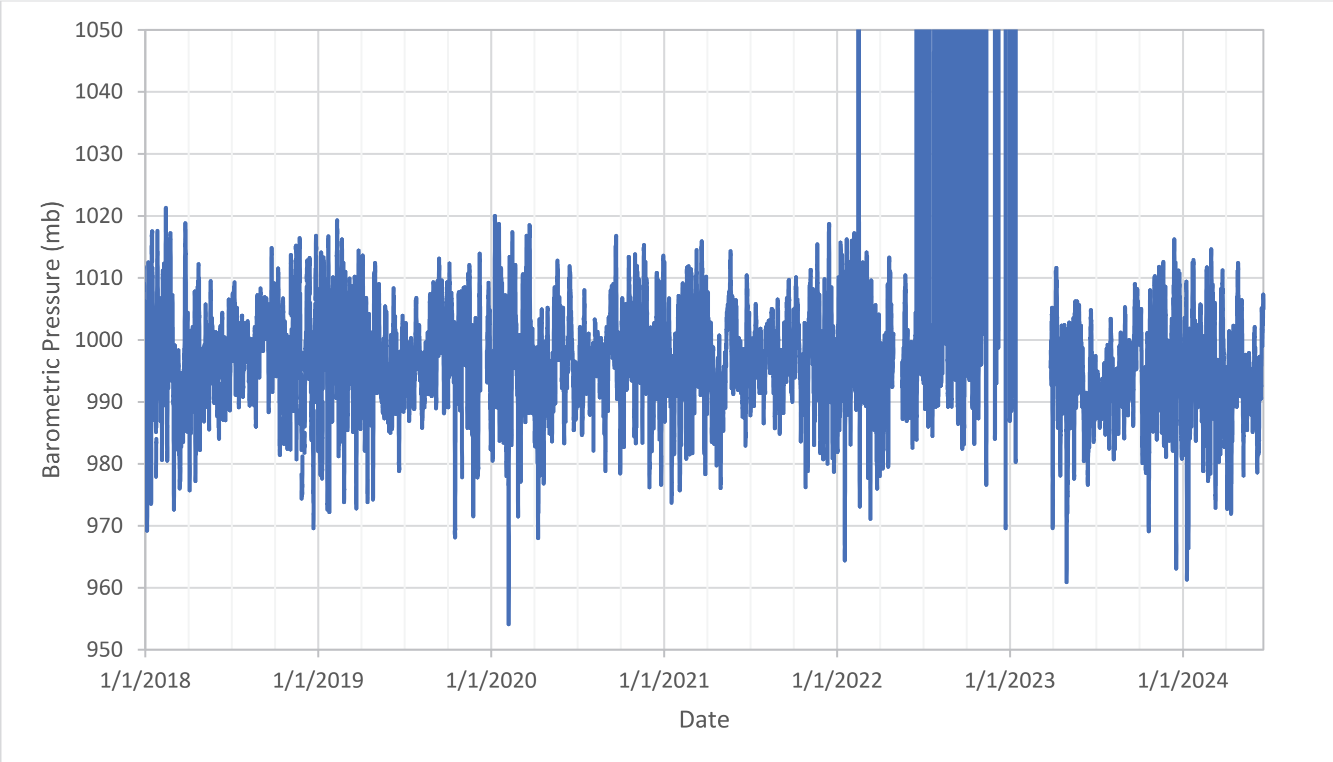

Figure 8. Time Series Plot of Measured Ambient 1-Hour Average Barometric Pressure

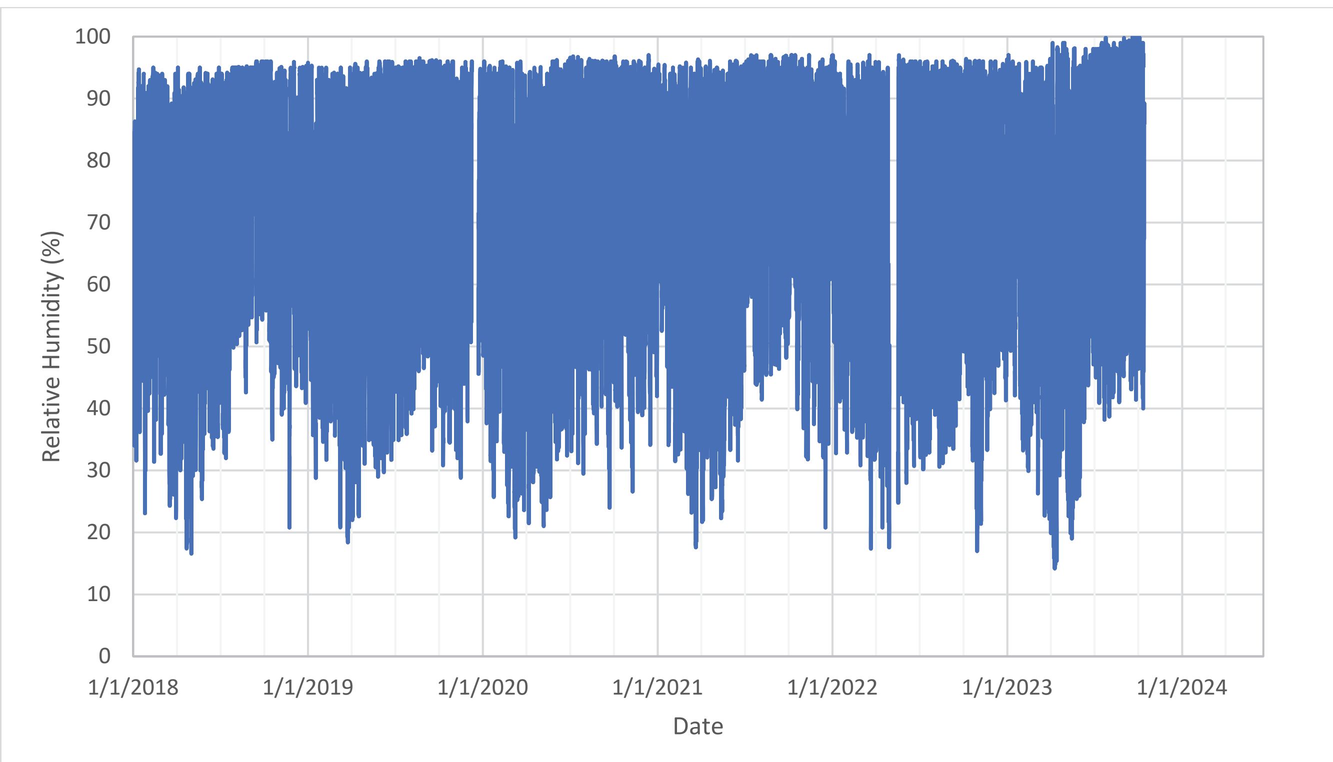

Figure 9. Time Series Plot of Measured Ambient 1-Hour Average Relative Humidity

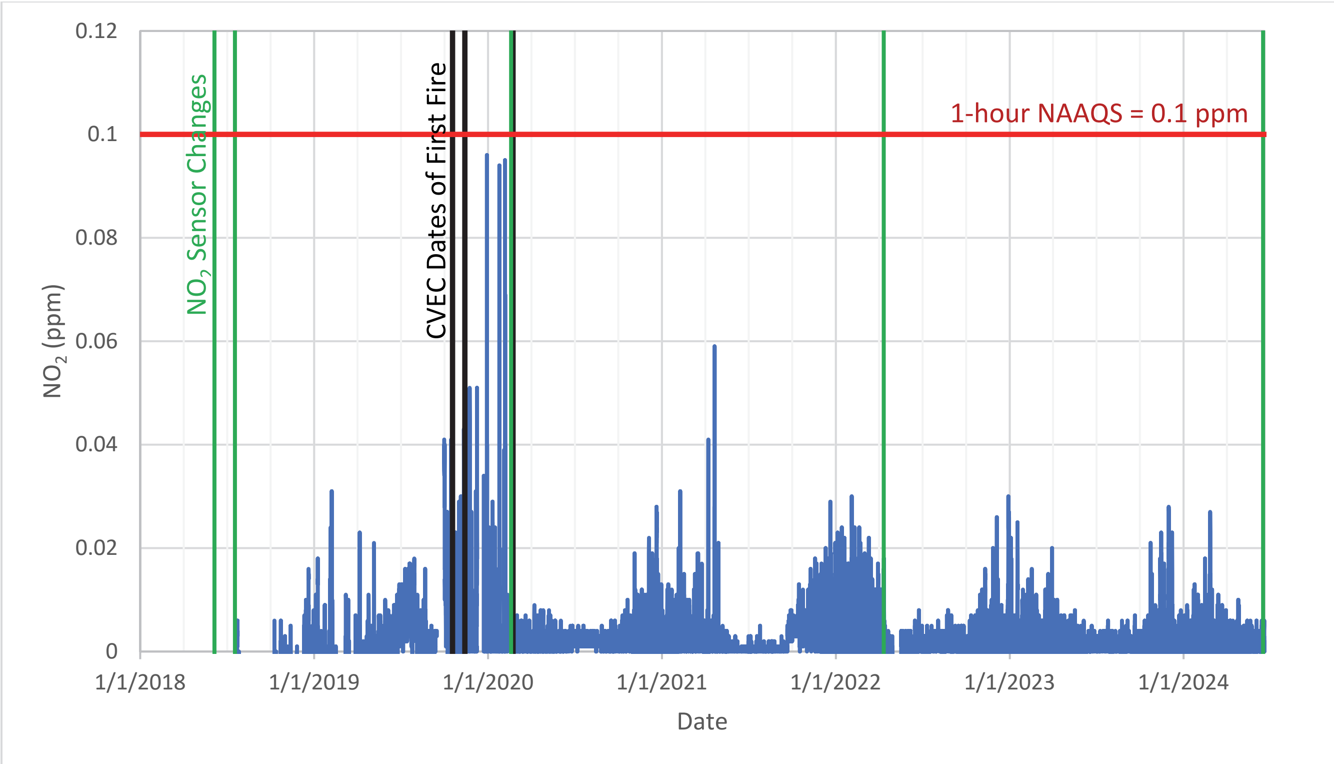

Figure 10. Time Series Plot of Measured Ambient Air Concentrations – 1-Hour Average NO_2

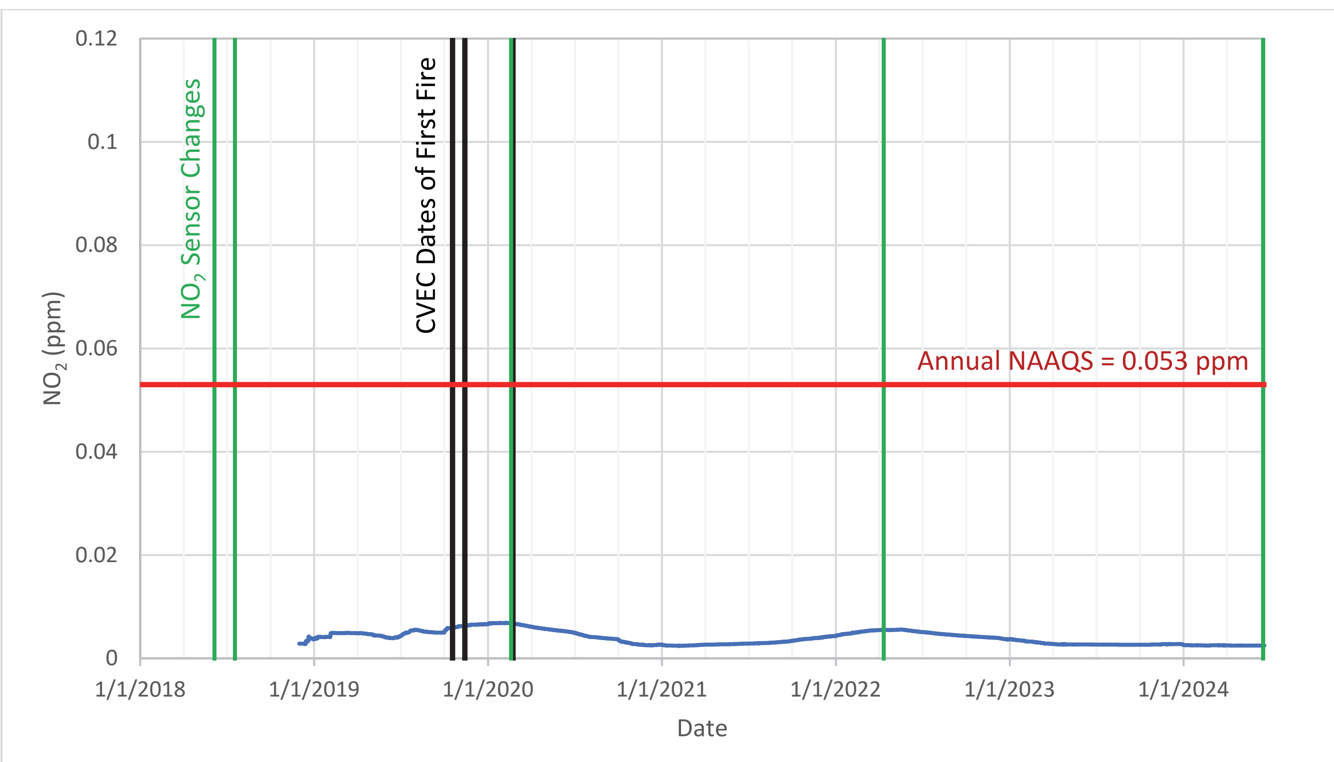

Figure 11. Time Series Plot of Measured Ambient Air Concentrations – Annual Rolling Average NO_2

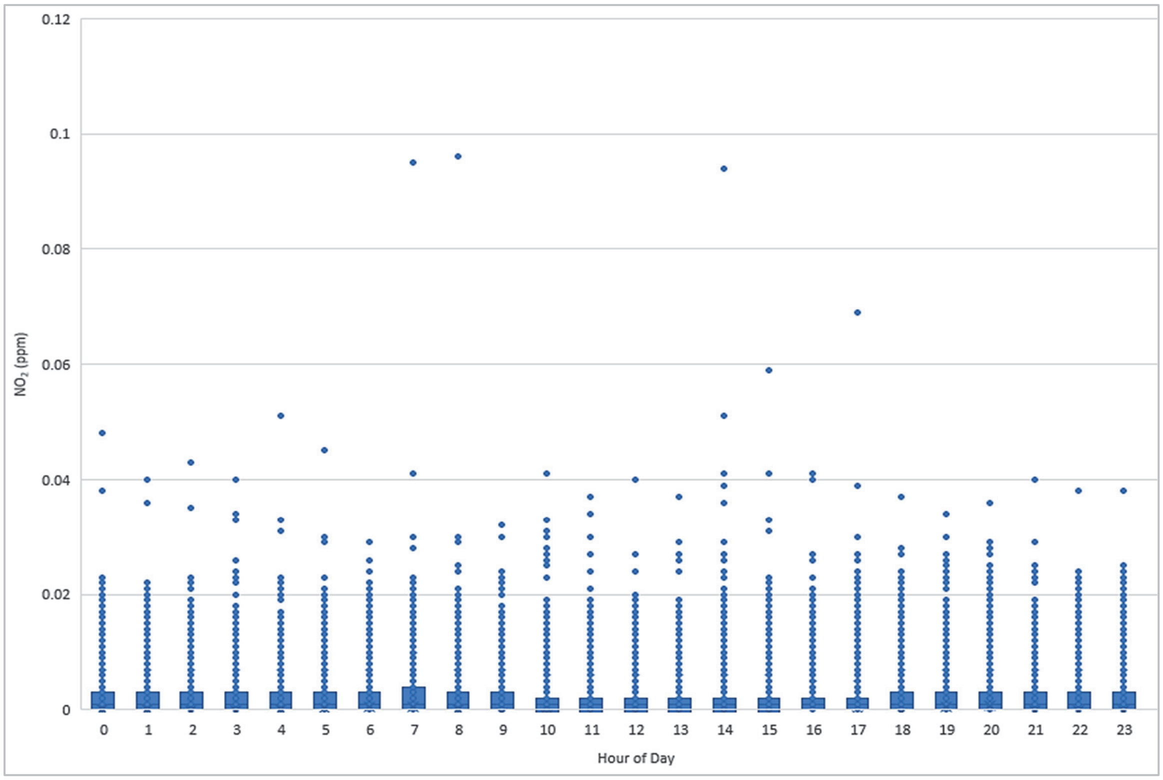

Figure 12. Box Plot of Measured 1-hour Average Ambient Air Concentrations by Hour of Day – NO_2

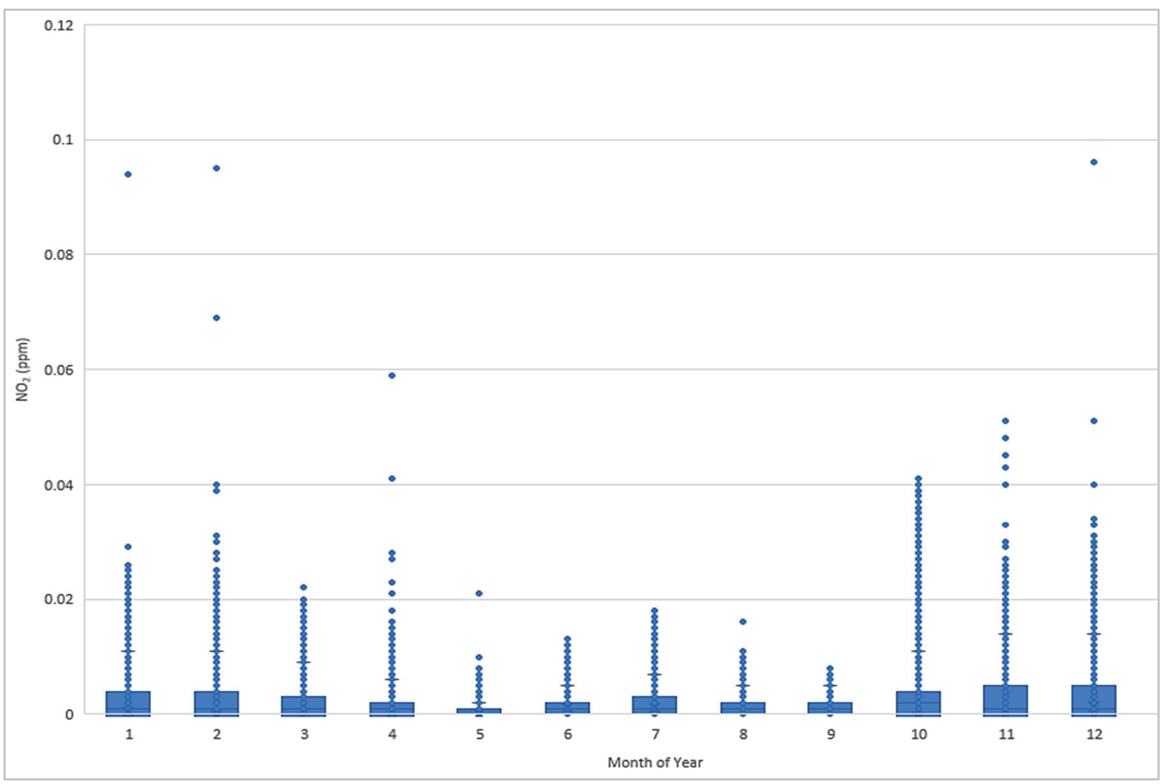

Figure 13. Box Plot of Measured 1-hour Average Ambient Air Concentrations by Month of Year – NO_2

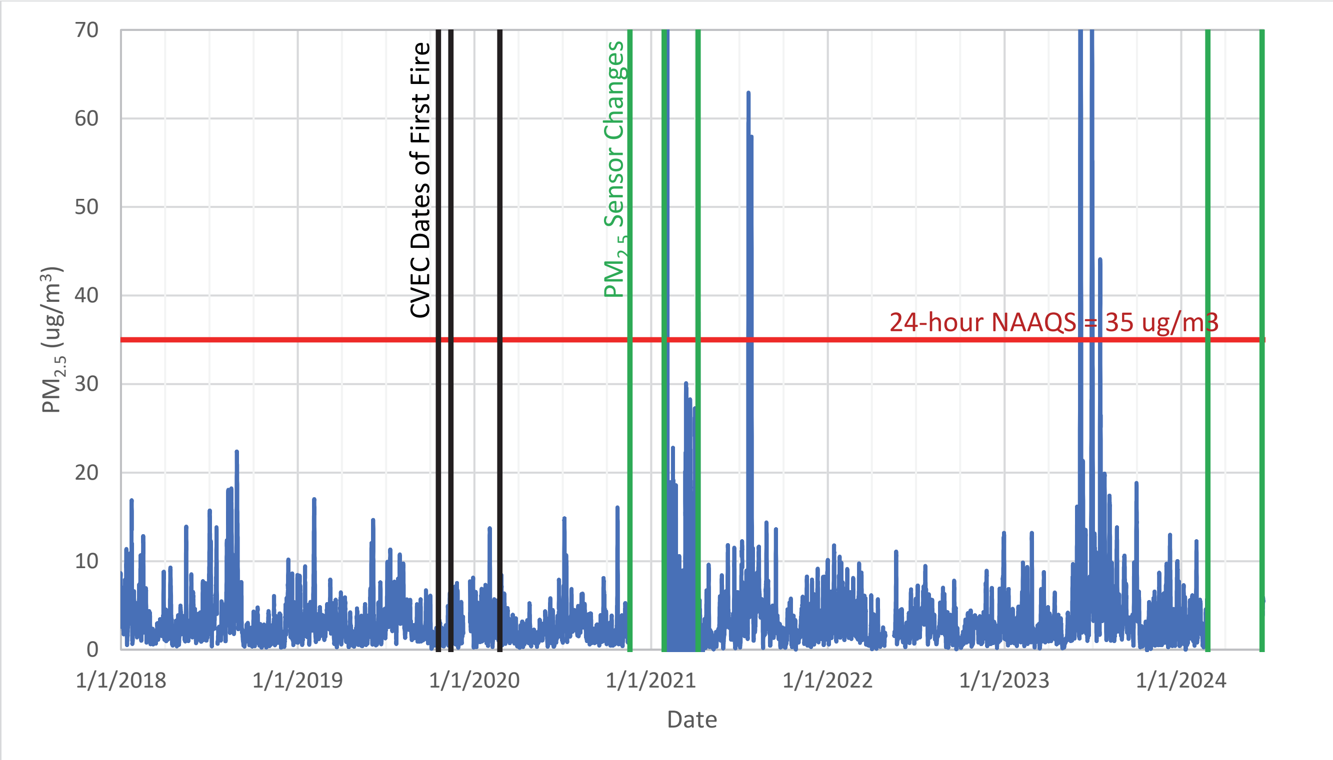

Figure 14. Time Series Plot of Measured Ambient Air Concentrations – 24-hour Rolling Average $PM_{2.5}$

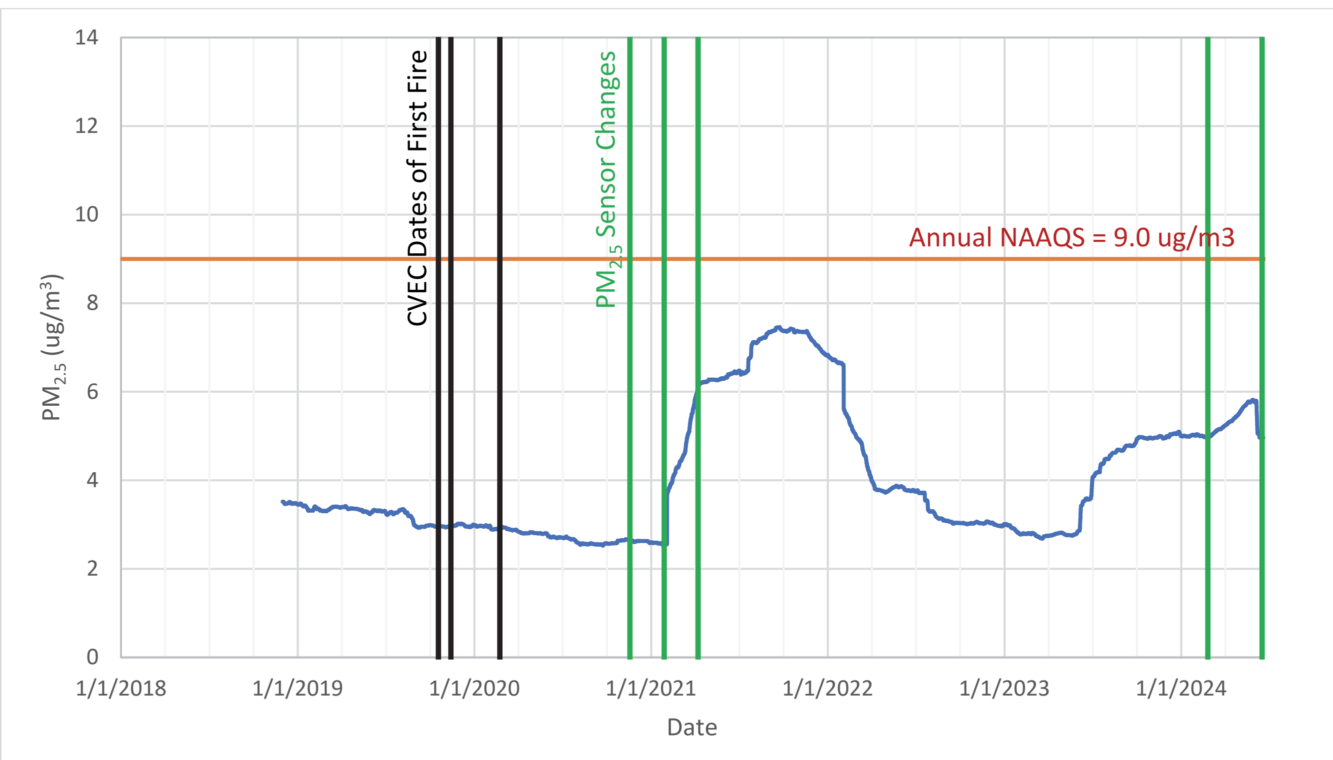

Figure 15. Time Series Plot of Measured Ambient Air Concentrations – Annual Rolling Average $PM_{2.5}$

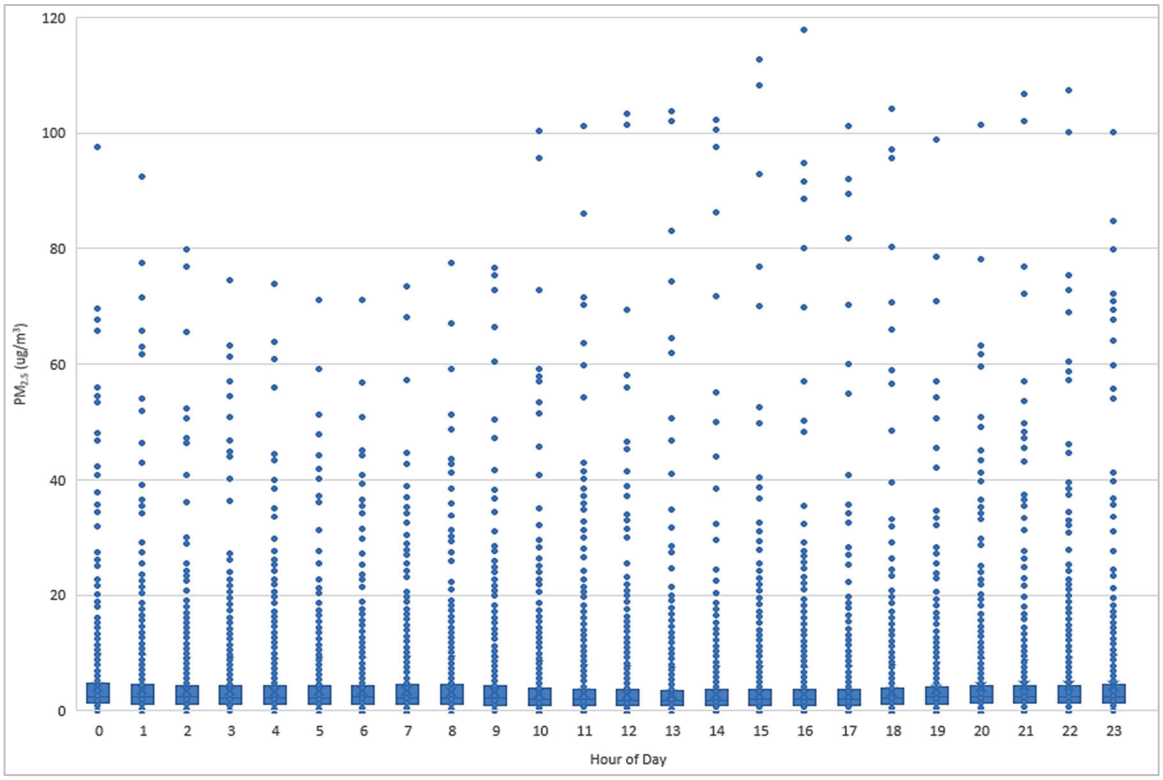

Figure 16. Box Plot of Measured 1-hour Average Ambient Air Concentrations by Hour of Day – $PM_{2.5}$

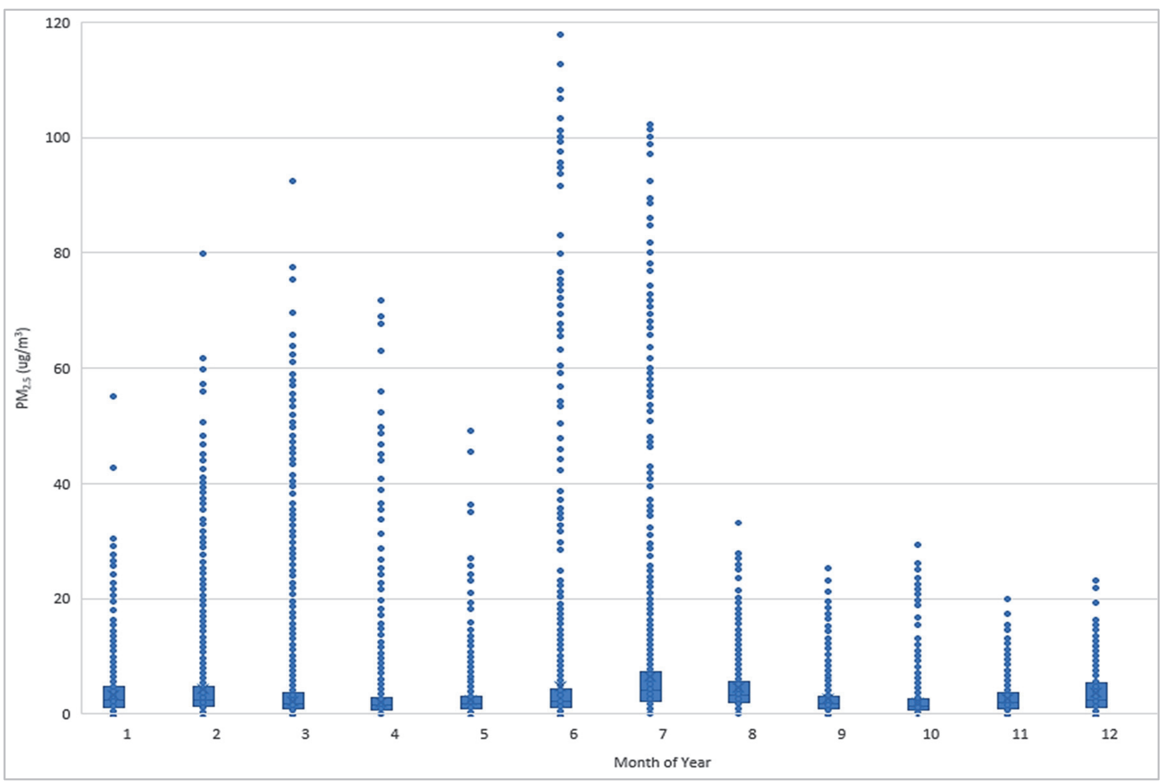

Figure 17. Box Plot of Measured 1-hour Average Ambient Air Concentrations by Month of Year – $PM_{2.5}$

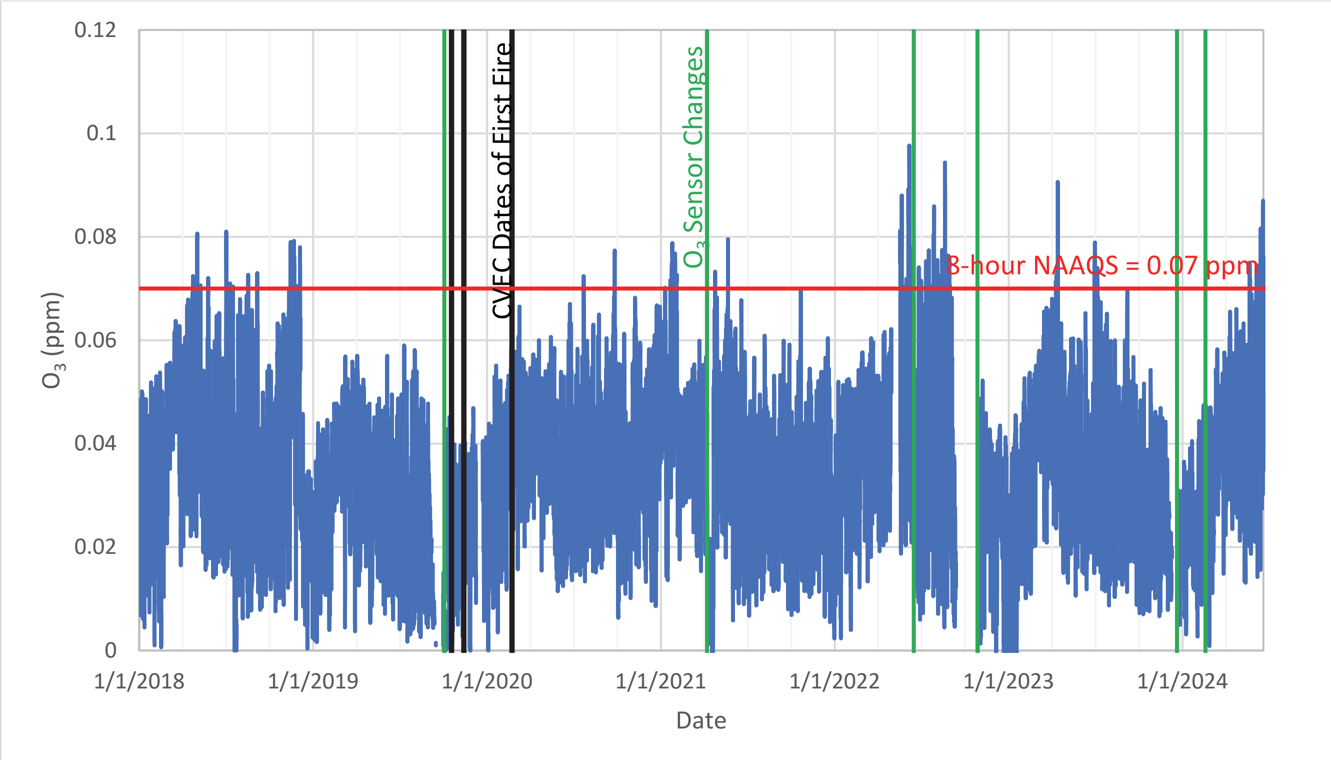

Figure 18. Time Series Plot of Measured Ambient Concentrations – 8-hour Rolling Average Ozone

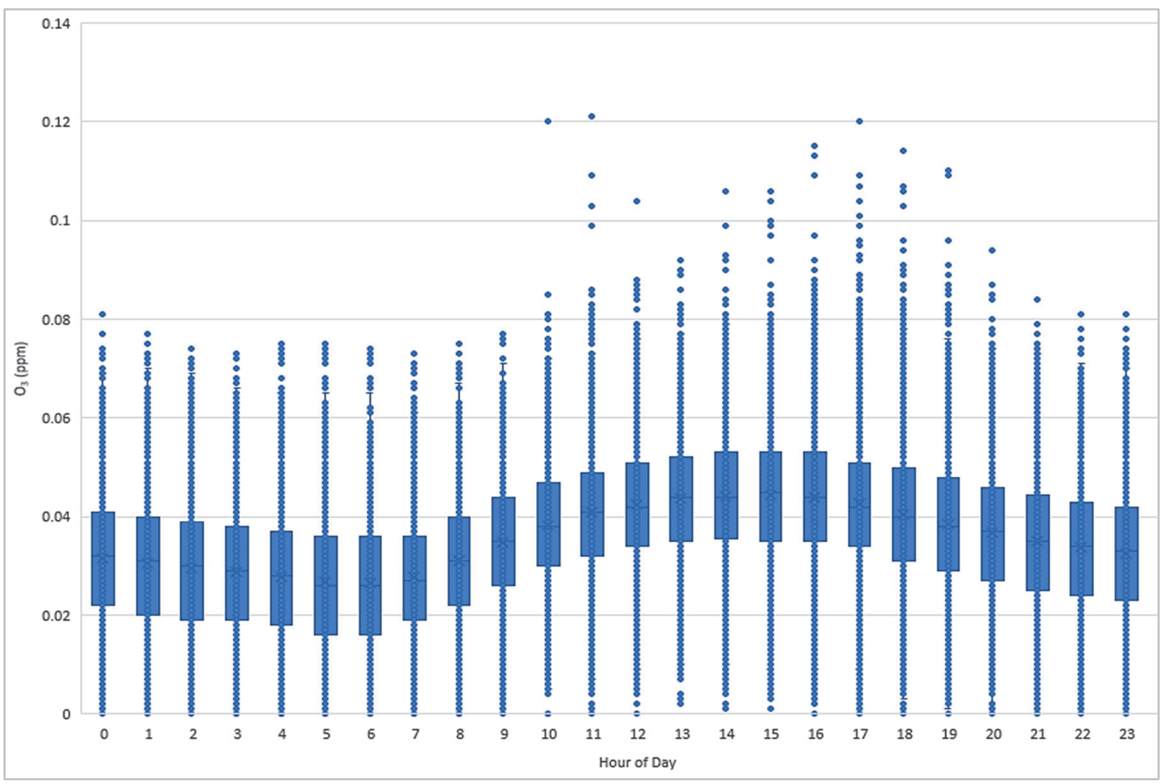

Figure 19. Box Plot of Measured 1-hour Average Ambient Concentrations by Hour of Day – Ozone

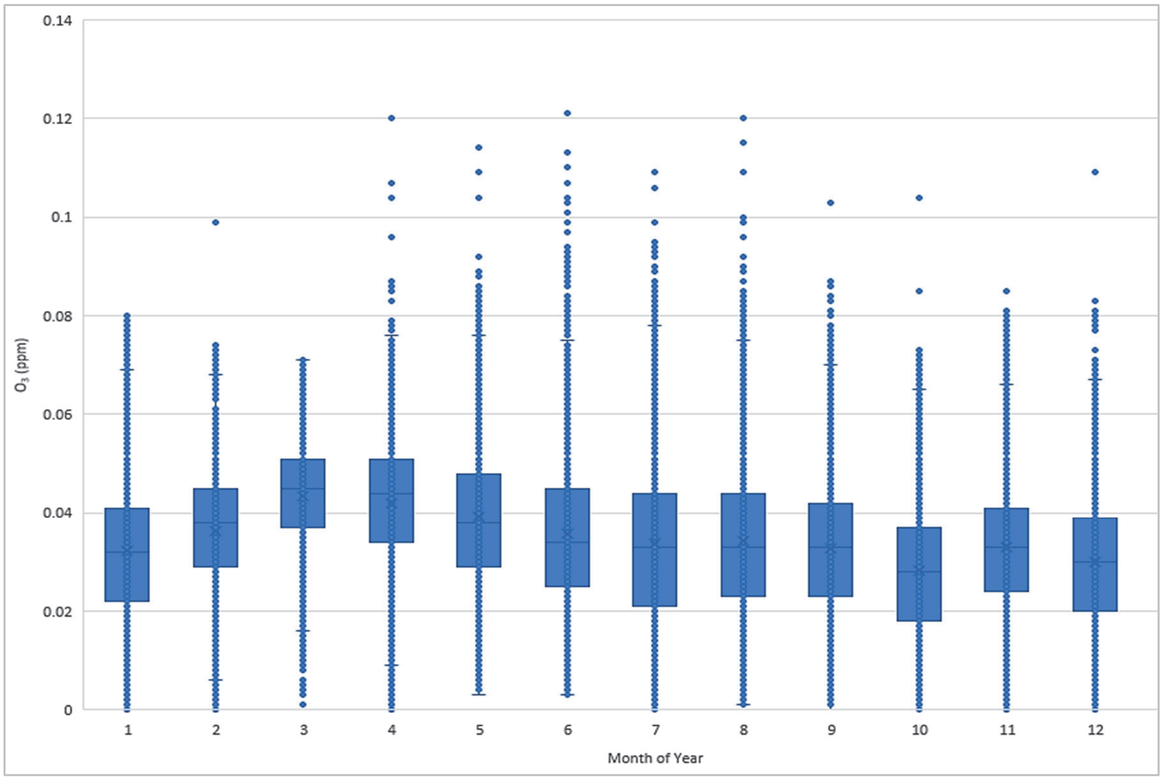

Figure 20. Box Plot of Measured 1-hour Average Ambient Concentrations by Month of Year – Ozone

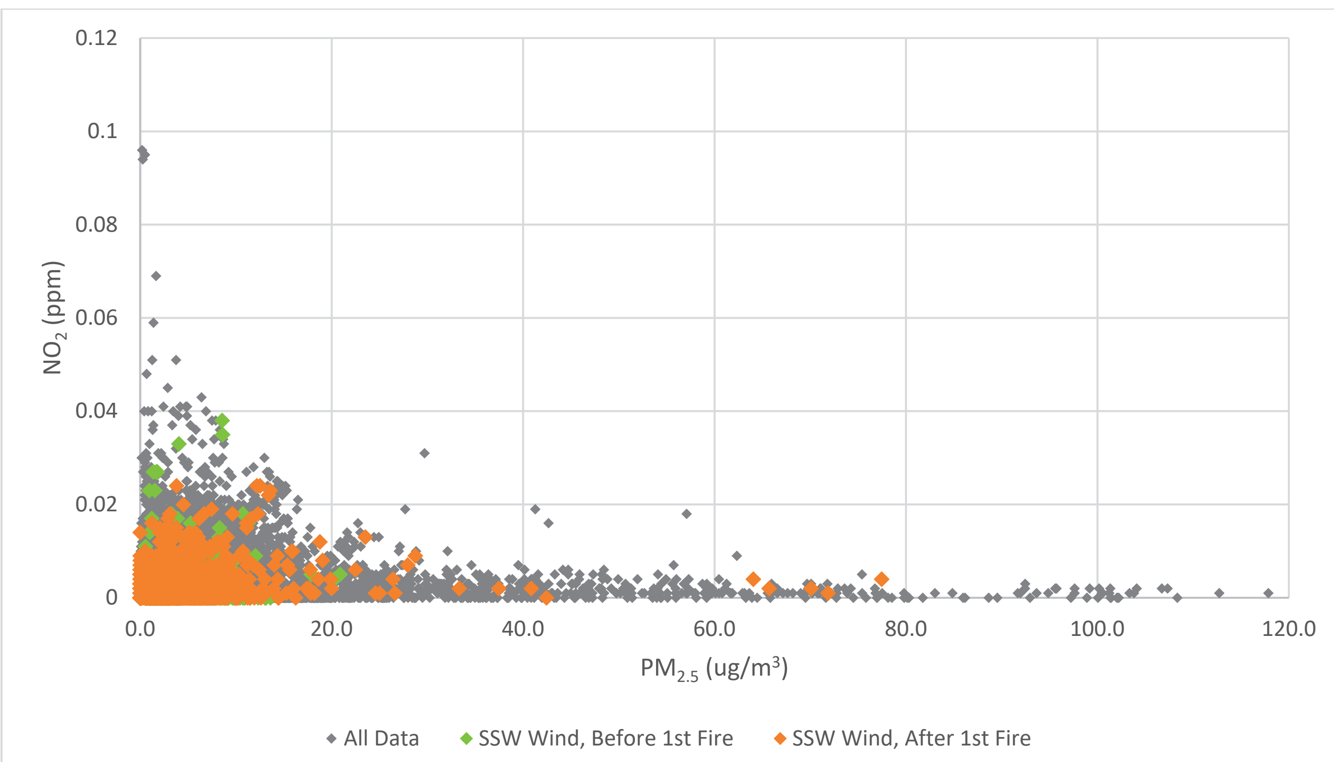

Figure 21. Scatterplot of Measured 1-Hour Average Ambient Air Concentrations – Concurrent NO_2 vs. $PM_{2.5}$

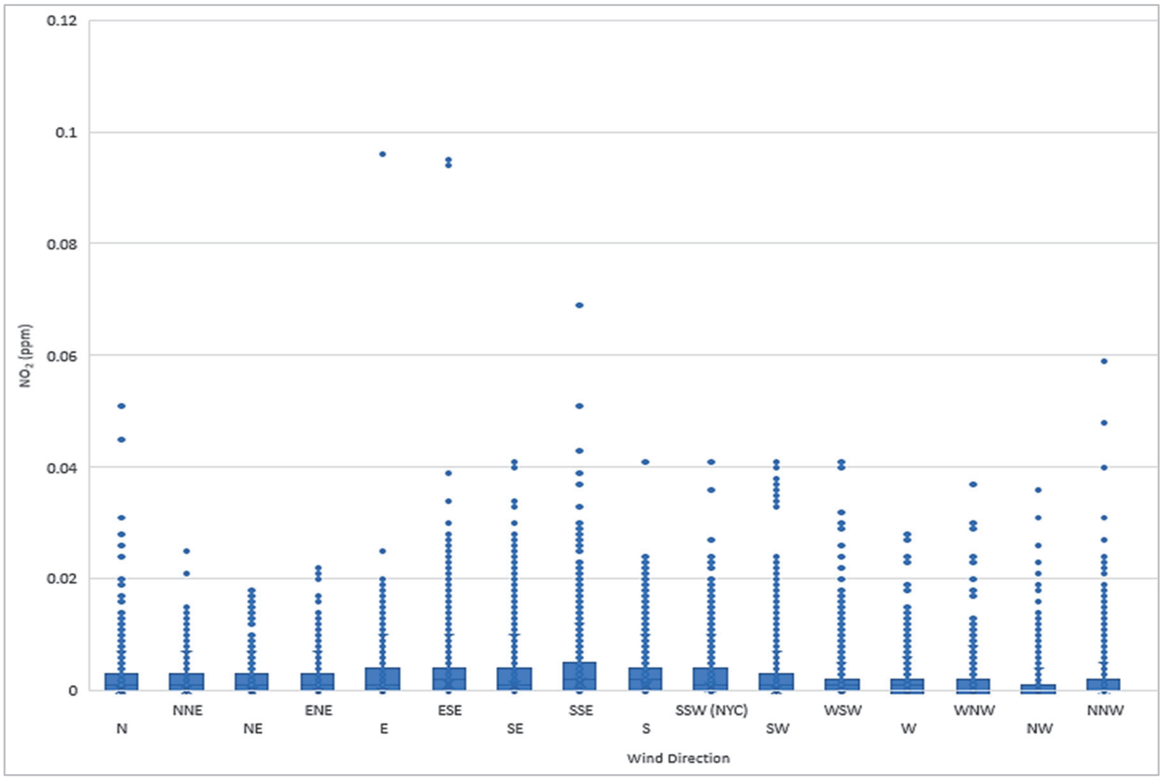

Figure 22. Box Plot of Measured 1-Hour Average Ambient Air Concentrations by Wind Direction – NO_2

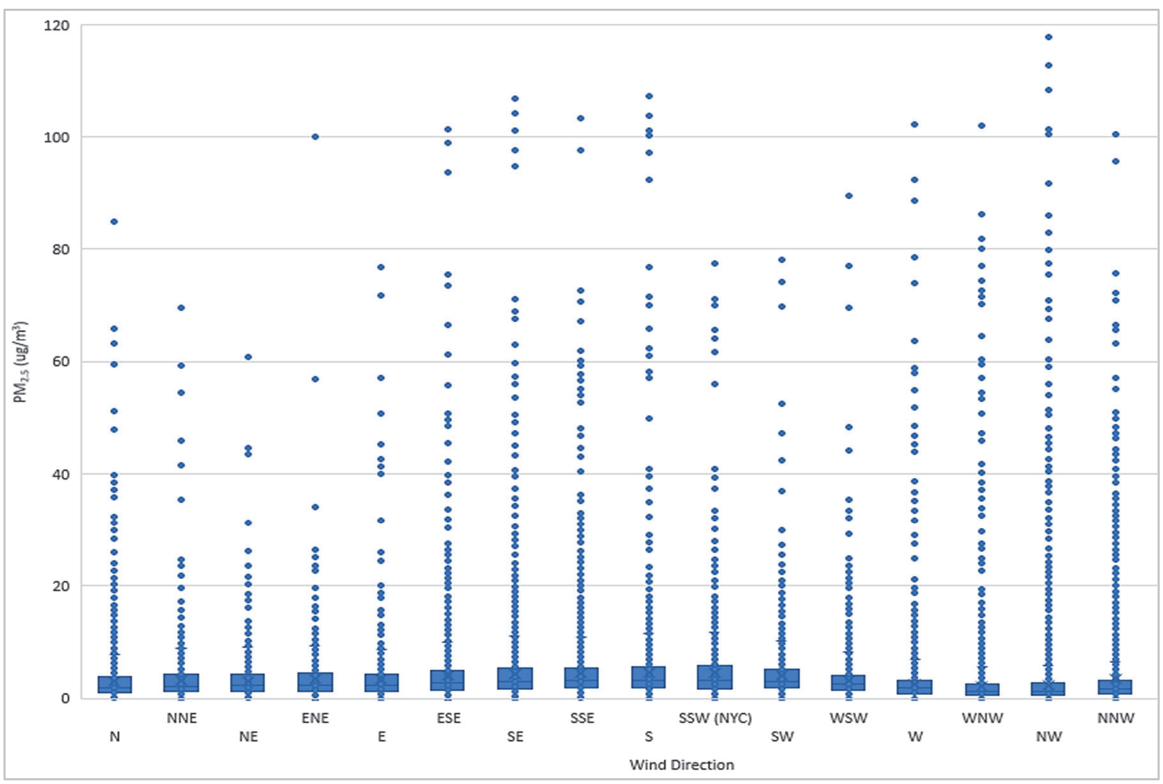

Figure 23. Box Plot of Measured 1-Hour Average Ambient Concentrations by Wind Direction – $PM_{2.5}$

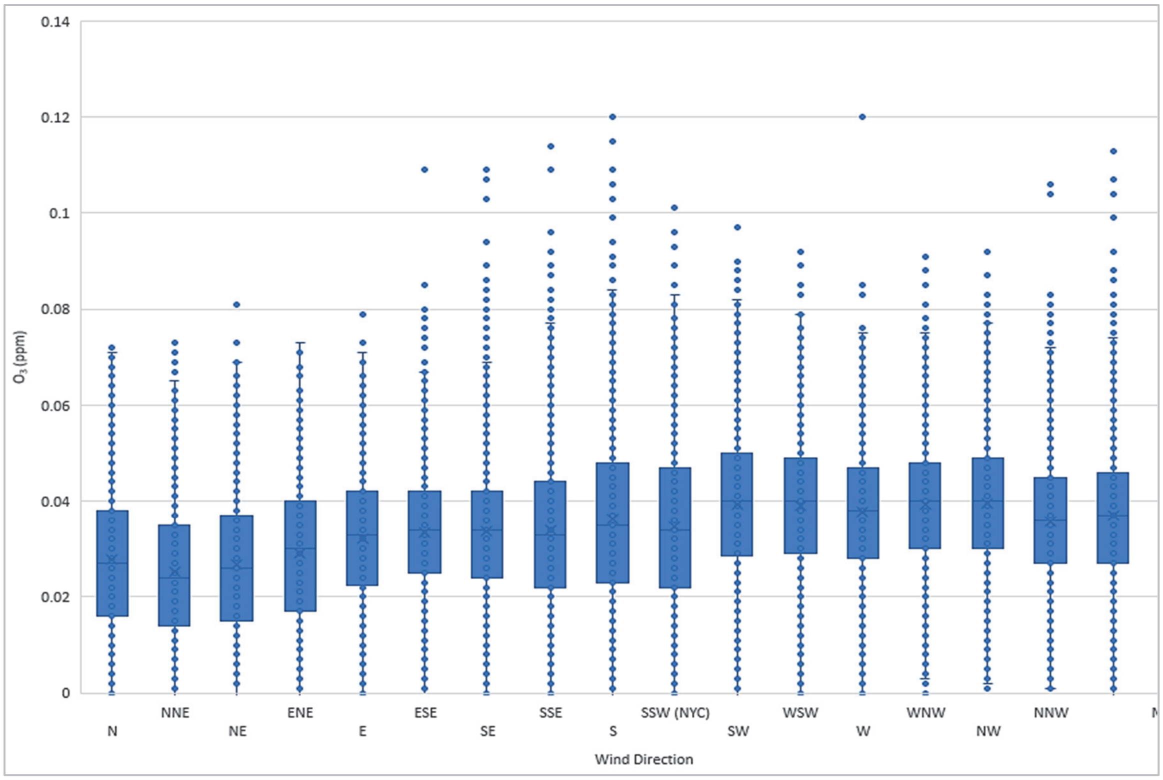

Figure 24. Box Plot of Measured 1-Hour Average Ambient Air Concentrations by Wind Direction – Ozone

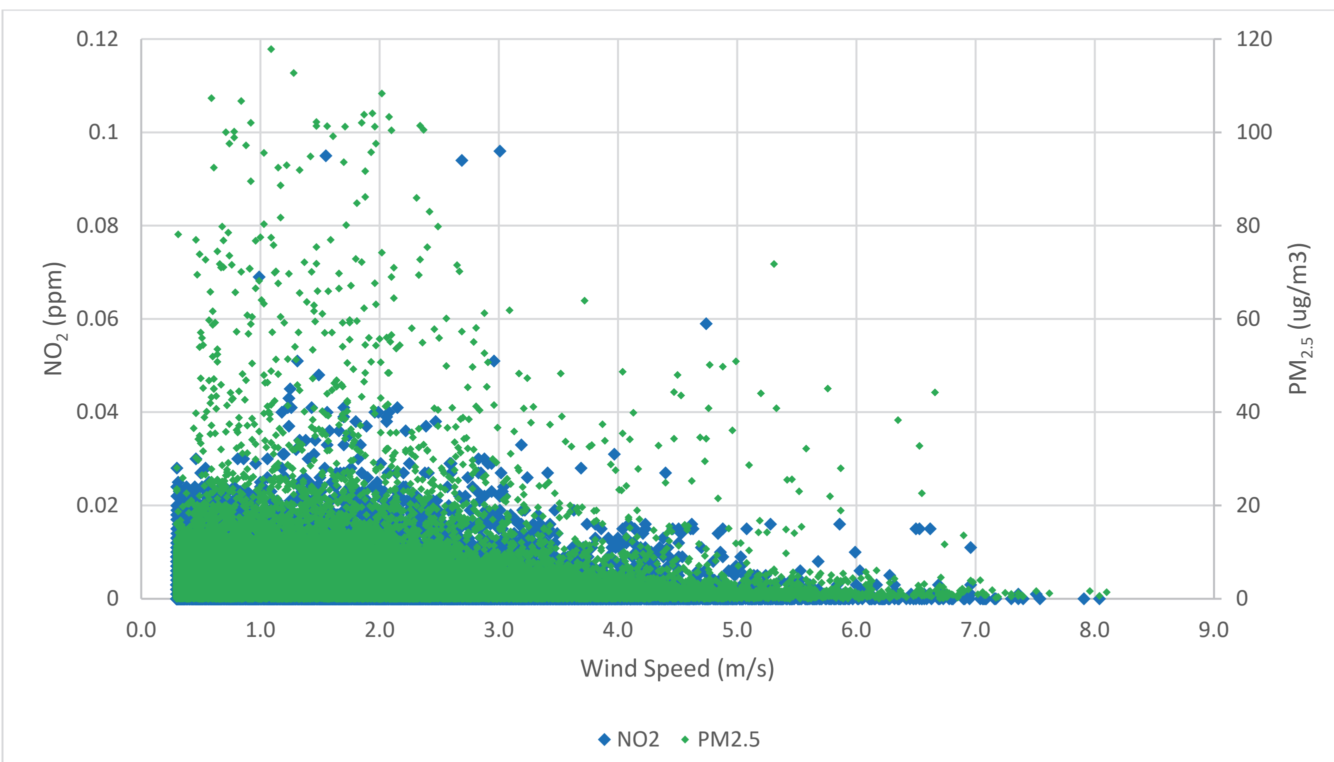

Figure 25. Scatterplot of Measured 1-Hour Ambient Air Concentrations (NO_2 and $PM_{2.5}$) vs. Wind Speed