

# NEPTUNE AMBIENT AIR QUALITY MONITORING ANNUAL REPORT



## NEPTUNE BULK TERMINALS LTD.

Report Date: March 31<sup>st</sup>, 2021



# NEPTUNE BULK TERMINALS LTD.

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## **1 BACKGROUND**

To meet Metro Vancouver Air Permit GVA0081 (issued September 23<sup>rd</sup>, 2016) requirements, Neptune Bulk Terminals Ltd. (Neptune) has implemented a procedure for periodic permit reporting requirements to Metro Vancouver.

Fulfilling these requirements requires processing and checking large amounts of data. The procedures in this report provide an efficient means of processing large amounts of data and ensuring that all calculations and outputs generated are completed accurately. In order to increase the efficiency of this process, Neptune has implemented a data management system which allows for uploading of data to the Neptune database and generation of outputs. Envirochem Services Inc. (Envirochem) has been retained to calculate, tabulate and report these requirements to Metro Vancouver and ensure that:

- Raw data being collected and used for generating outputs is valid,
- Correct methodologies are used to generate these outputs, and
- Any outputs being generated undergo quality assurance/quality control (QA/QC) before being submitted electronically to Metro Vancouver.

All of the procedures contained within this report detail methodologies in conformance with Section 3 Schedules A and B of the current version of the permit (September 23<sup>rd</sup>, 2016).

This report includes annual ambient air quality monitoring reporting requirements.

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## **2 AMBIENT AIR QUALITY MONITORING PROGRAM**

### **2.1 WIND MONITORING DATA ANALYSIS**

#### **2.1.1 METHODOLOGY**

Envirochem retrieves wind data from Neptune's database at the following locations: On-site (Electrical Substation), Neptune Office Building (340 Brooksbank Ave.), and Neighborhood Pole (618 2<sup>nd</sup> St. East).

- Using wind data, three wind roses (one for each wind instrument location) are prepared for the preceding year. The wind roses are shown in **Figure 1**.
- Envirochem submits these figures to Metro Vancouver for each preceding calendar year as part of the annual air quality monitoring program report.

#### **2.1.2 RESULTS**

Wind roses are presented in **Figure 1** below representing the distribution of wind direction and wind speed at Neptune on-site (Neptune Electrical Substation) and off-site monitors (roof of Neptune Office Building and Neighbourhood Pole) for 2020.

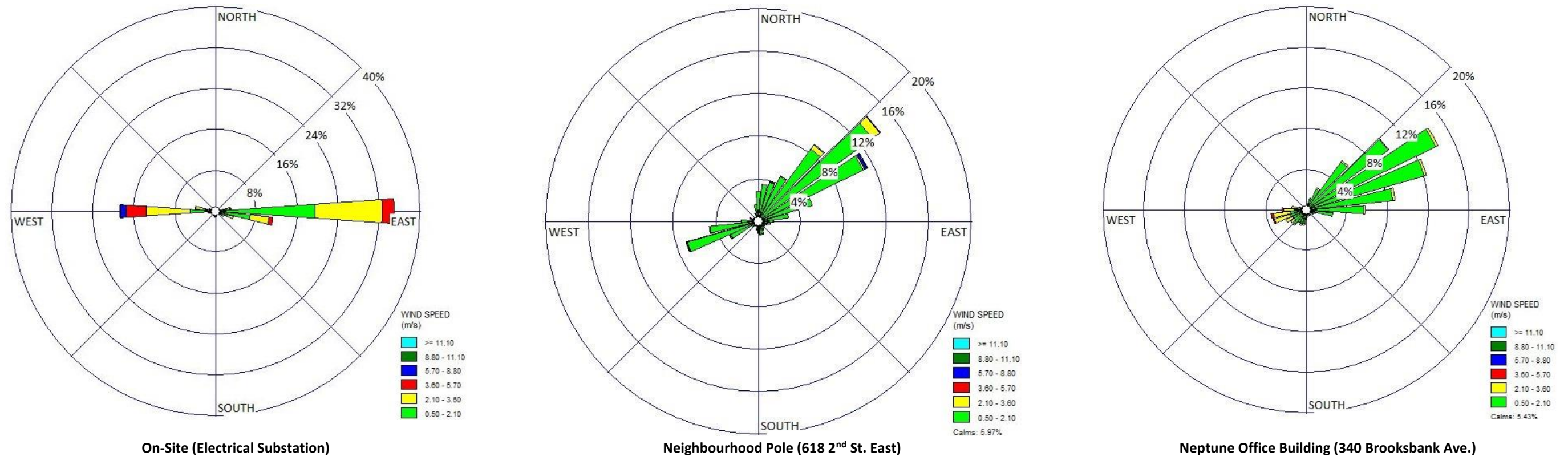


Figure 1: Windroses (direction wind blowing from) at on-site and off-site monitoring stations for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

Note: Scales are not consistent between wind roses.



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## **2.2 PARTICULATE MONITORING DATA ANALYSIS**

### **2.2.1 METHODOLOGY**

Neptune is conducting continuous PM<sub>2.5</sub> and PM<sub>10</sub> monitoring. Ambient Air Monitoring data for PM<sub>2.5</sub> and PM<sub>10</sub> are stored in Neptune's database. These data are retrieved and verified by Envirochem. QA/QC is performed on the raw data and any invalid data are flagged. Neptune's data management system is then updated accordingly.

The vetted monitoring data are used to summarize the results of on-site and off-site monitoring. Envirochem retrieves the preceding calendar year's 24-hr rolling averages for PM<sub>2.5</sub> and PM<sub>10</sub> at each instrument location from Neptune's database.

Using the wind and hourly average concentration data, six pollution roses are prepared (both PM<sub>2.5</sub> and PM<sub>10</sub> at each location) and corresponding frequency distributions are prepared for the preceding year.

### **2.2.2 TREND ANALYSES**

Using Neptune's data management system, Envirochem:

- Converts and tabulates the vetted PM<sub>2.5</sub> and PM<sub>10</sub> data to 24-hour rolling averages and performs QA/QC;
- Submits the graphs (**Figure 2 - Figure 7**) to Metro Vancouver.

The trend analyses represent 24-hour rolling averages of PM<sub>2.5</sub> and PM<sub>10</sub> data measured on-site (Electrical Substation), at the Neptune Office Building (340 Brooksbank Ave.), and at 618 2<sup>nd</sup> St. East. Any gaps in the trend analyses are due to missing or invalid data.

The on-site and off-site PM<sub>2.5</sub> and PM<sub>10</sub> ambient air quality monitors showed a few AAQO exceedances in 2020. The only exceedances at the off-site monitors were during September and were primarily caused by wildfire smoke entering the region from the United States (exceedances were observed across the region). Outside of this period, the only other exceedances were of the PM<sub>10</sub> objective at the on-site air quality monitor in May which were likely due to other off-site sources in the area. These exceedances were discussed in more detail in the quarterly ambient air quality monitoring reports.

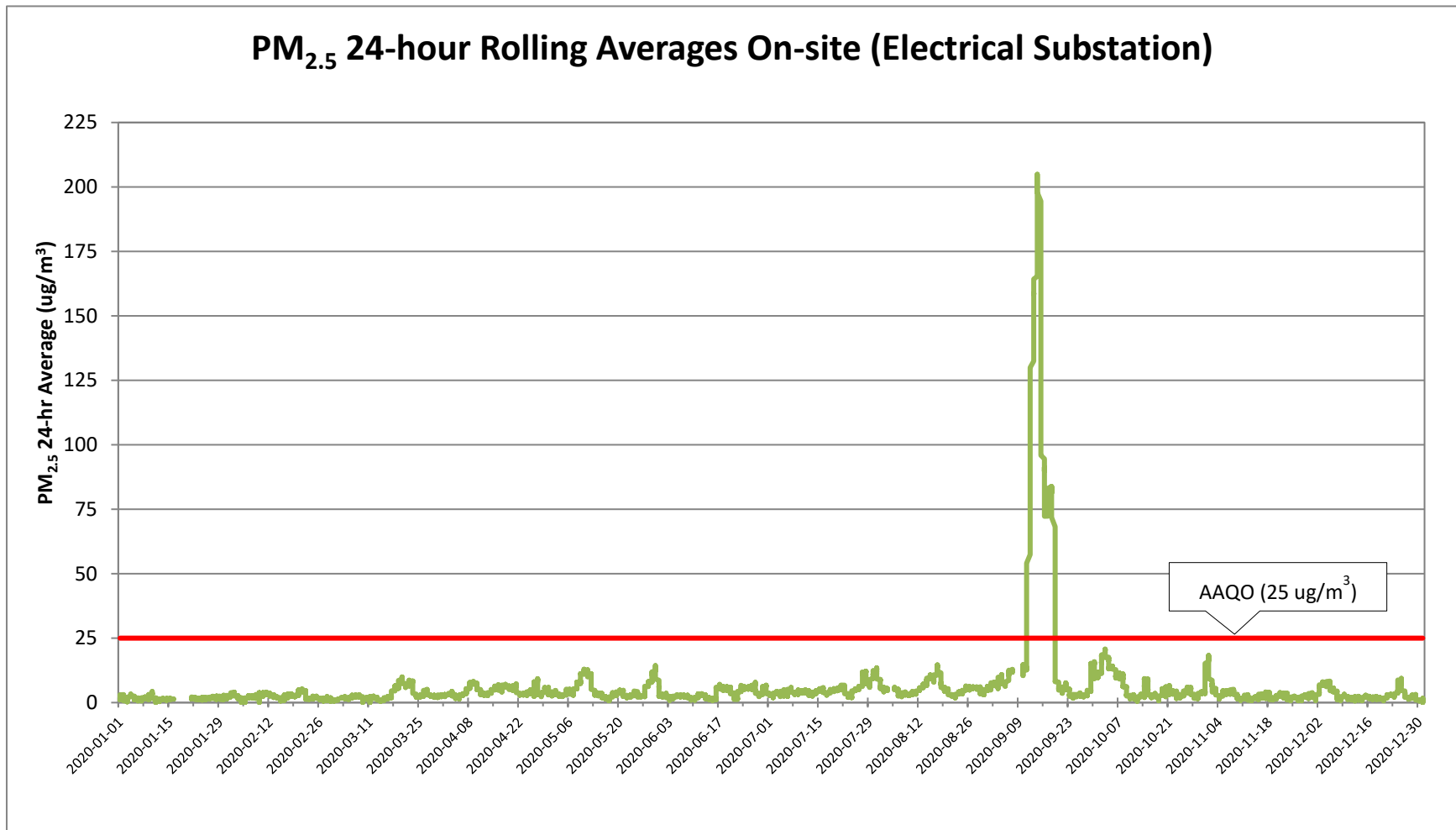


Figure 2: 24-hour rolling averages of PM<sub>2.5</sub> from on-site monitor (Electrical Substation) for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

*Note: Blank spaces indicates no data available.*



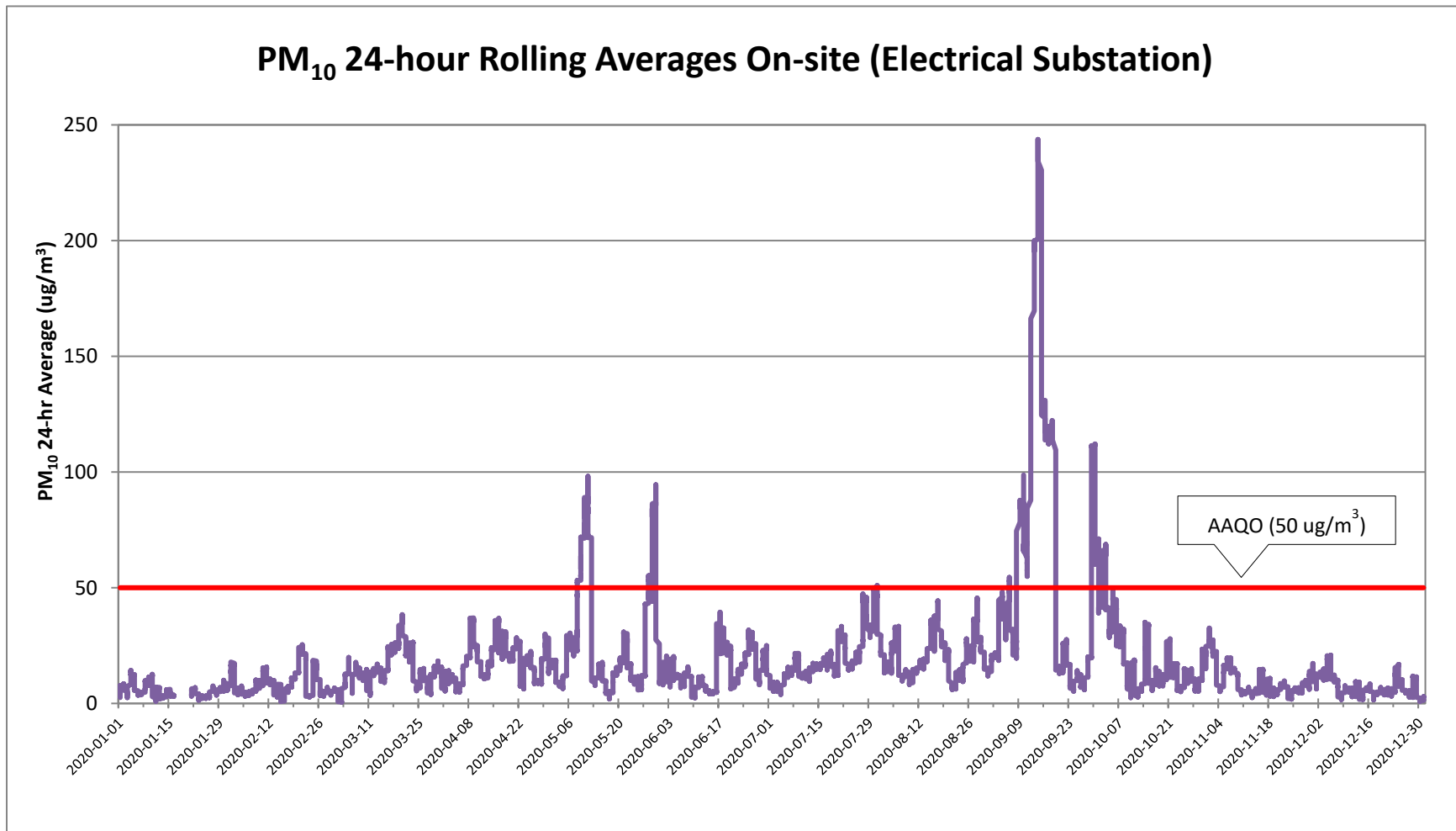


Figure 3: 24-hour rolling averages of PM<sub>10</sub> from on-site monitor (Electrical Substation) for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

*Note: Blank spaces indicates no data available.*

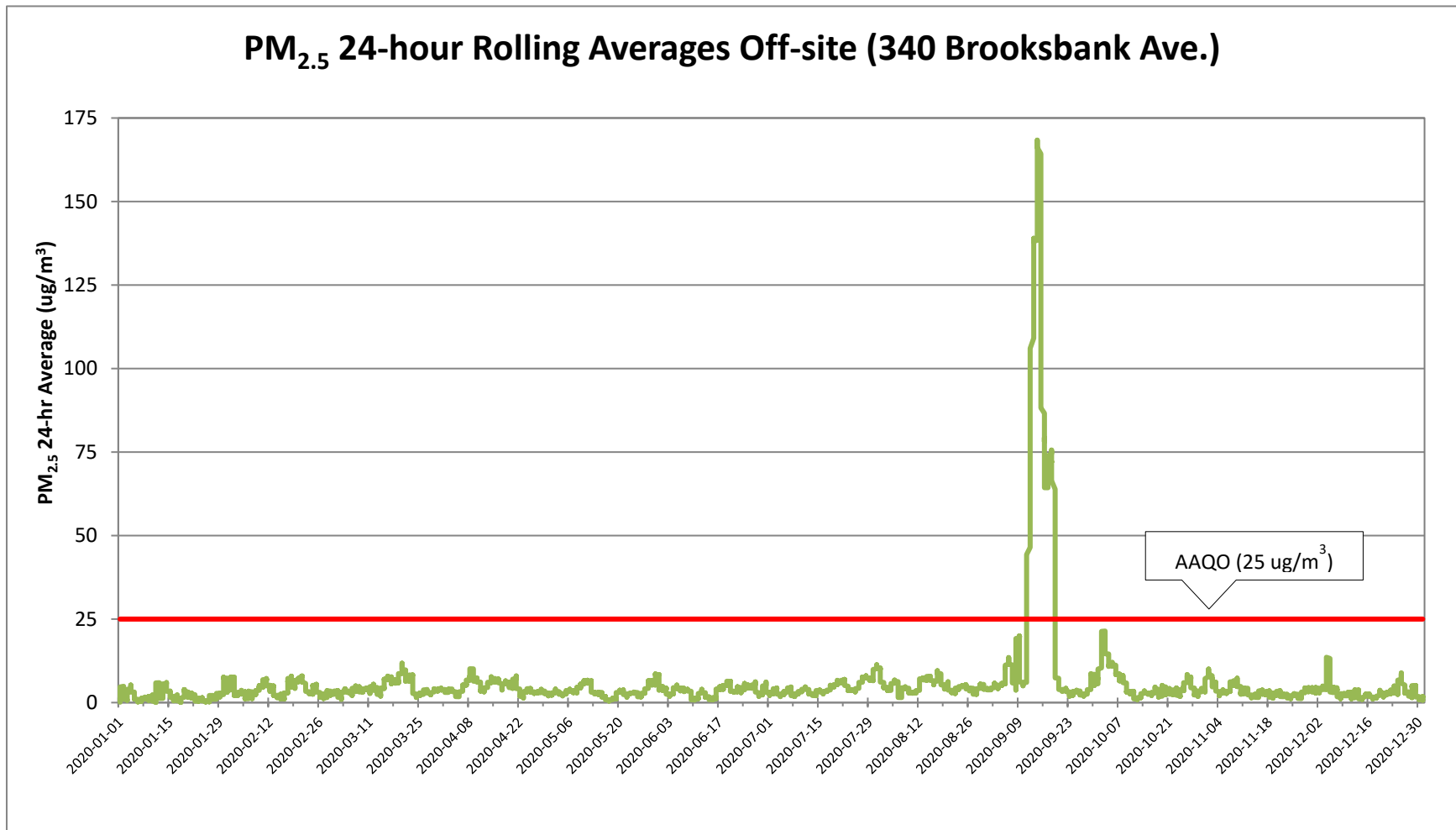
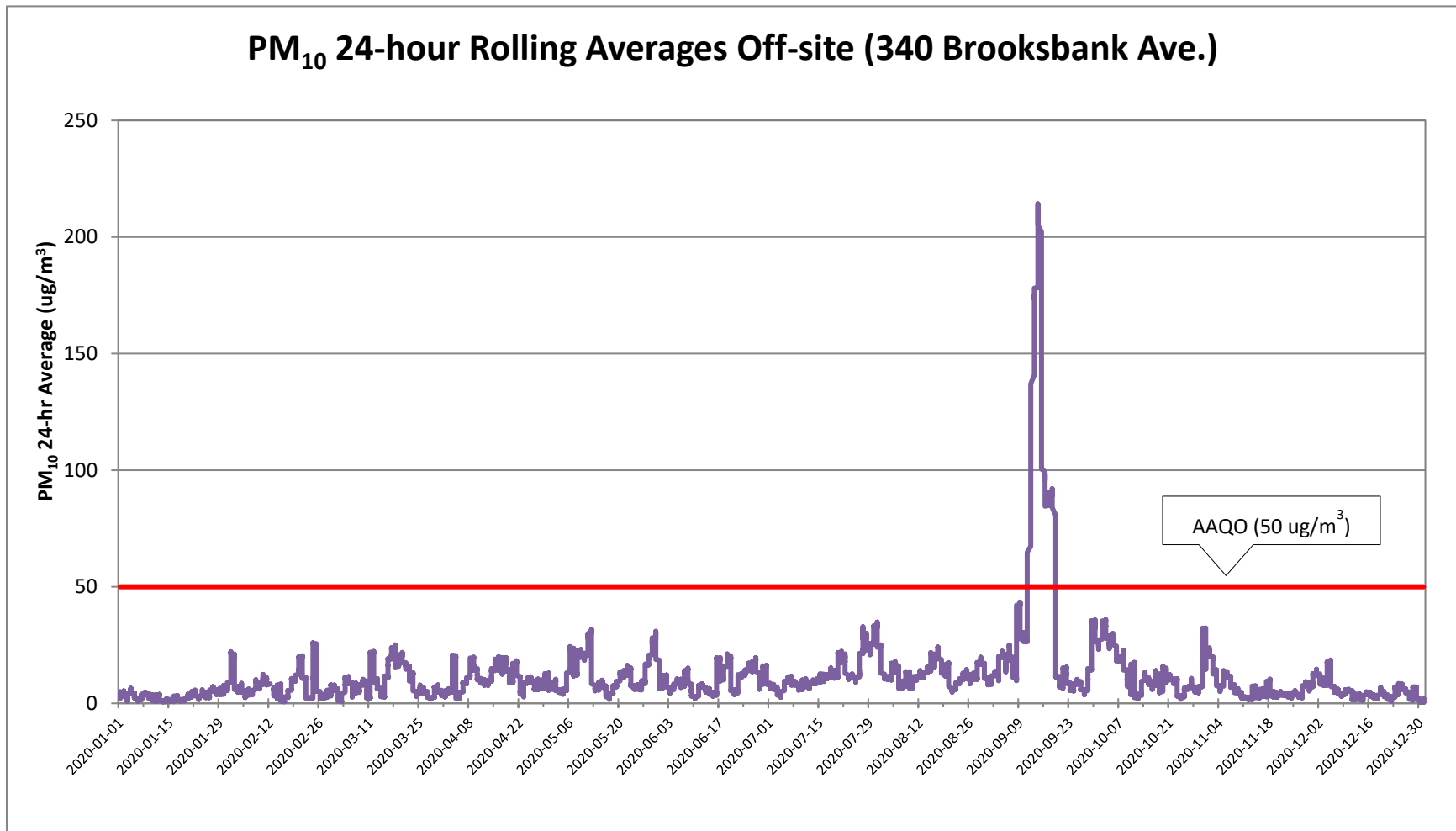


Figure 4: 24-hour rolling averages of PM<sub>2.5</sub> from off-site monitor at the Neptune Office Building (340 Brooksbank Ave.)  
for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

*Note: Blank spaces indicates no data available.*



**Figure 5: 24-hour rolling averages of PM<sub>10</sub> from off-site monitor at Neptune Office Building (340 Brooksbank Ave.)  
for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020**

*Note: Blank spaces indicates no data available.*

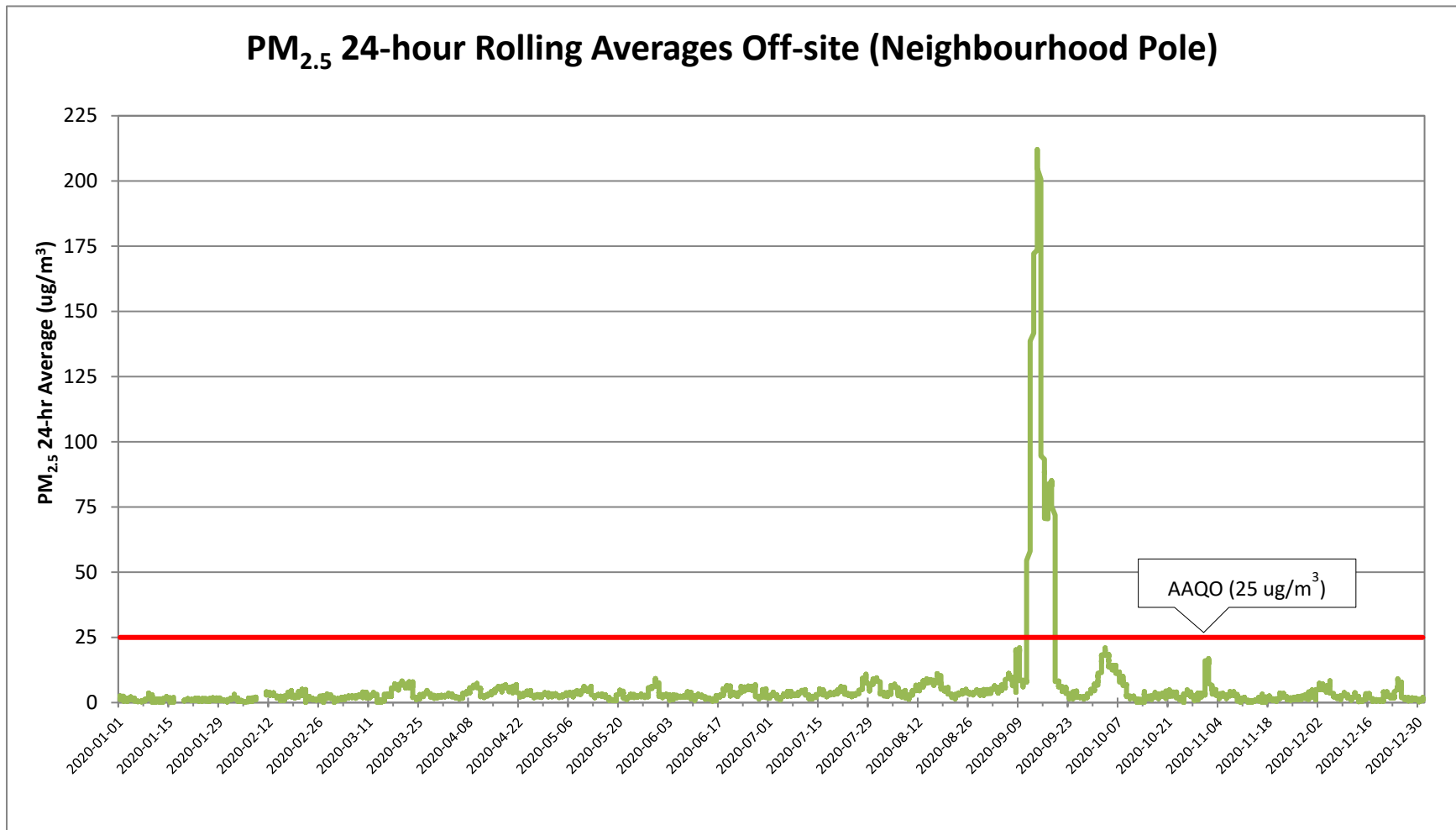


Figure 6: 24-hour rolling averages of PM<sub>2.5</sub> from off-site monitor at 618 2<sup>nd</sup> St. East for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

*Note: Blank spaces indicates no data available.*

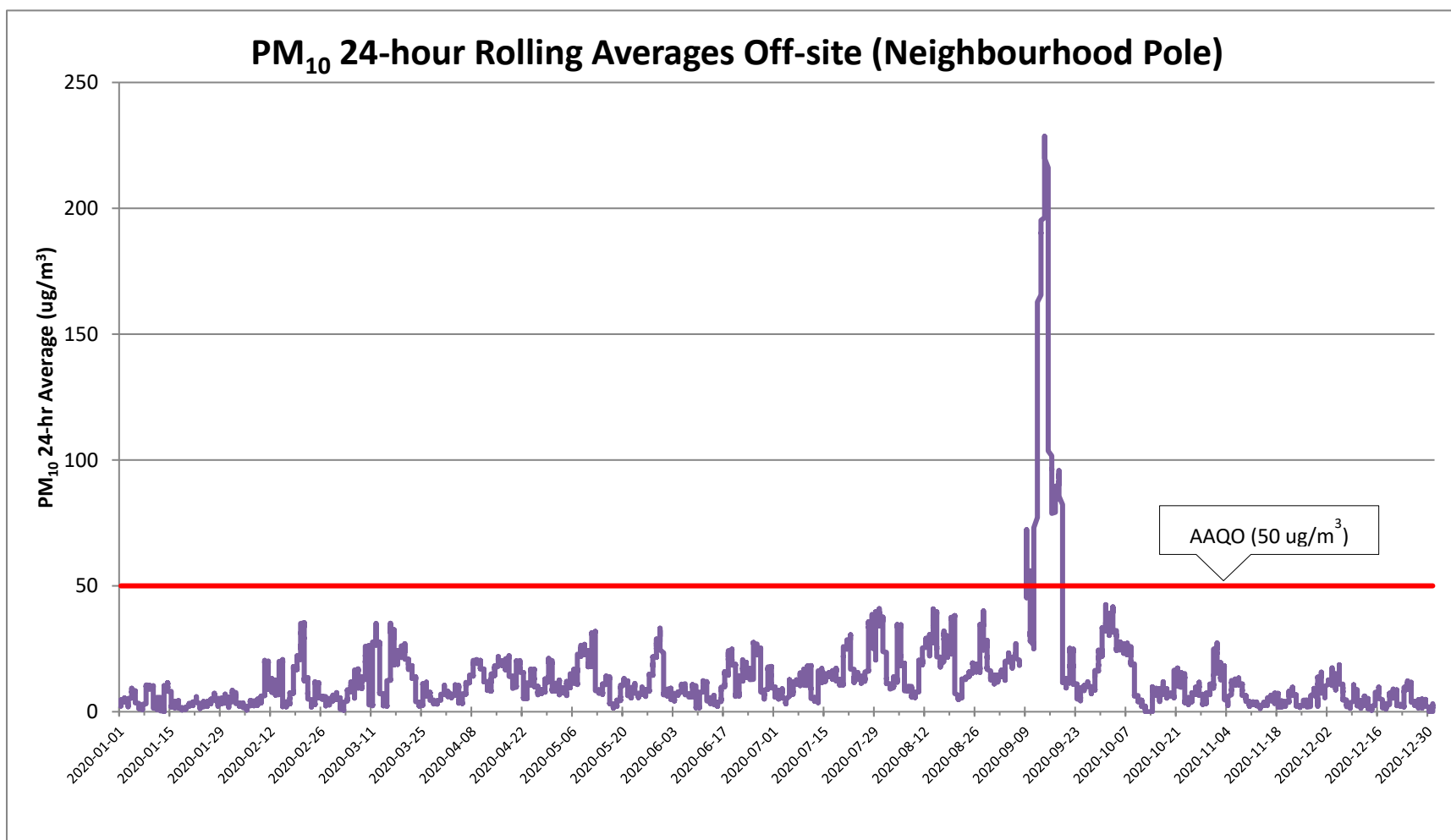


Figure 7: 24-hour rolling averages of PM<sub>10</sub> from off-site monitor at 618 2<sup>nd</sup> St. East for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

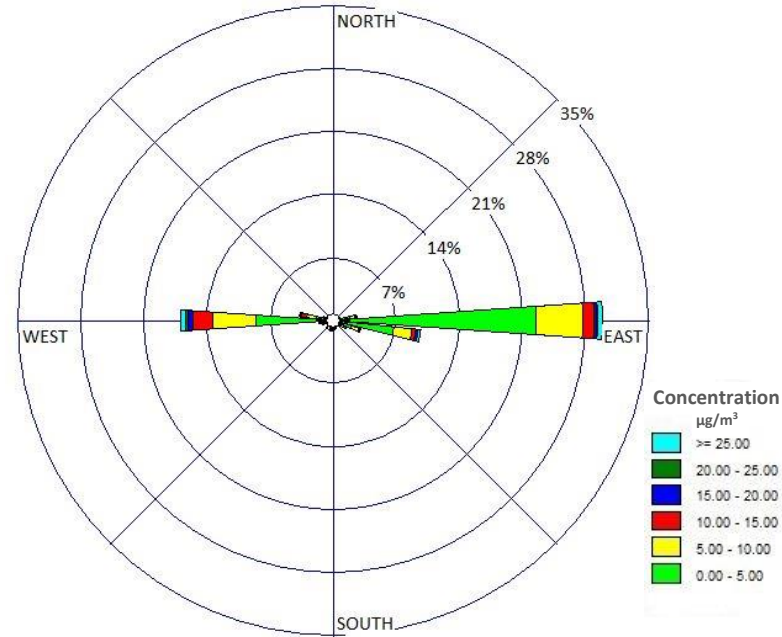
*Note: Blank spaces indicates no data available.*

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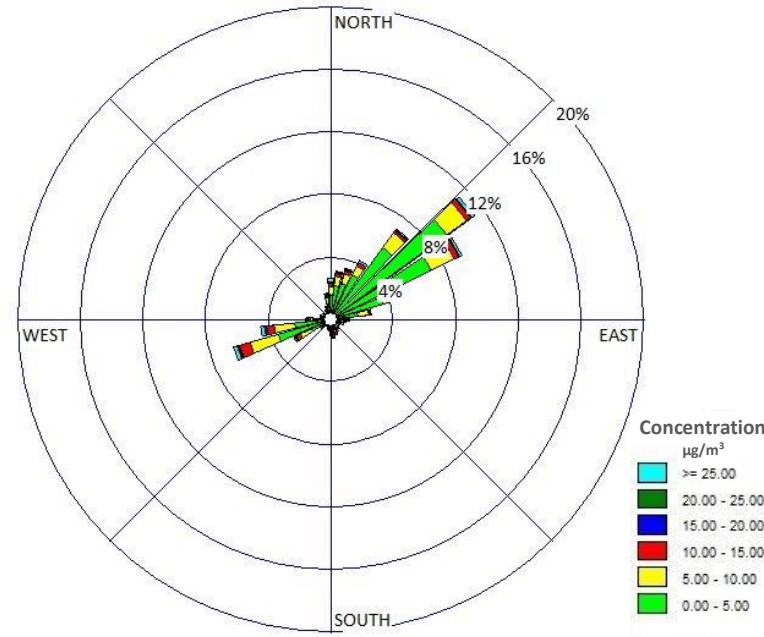
### **2.2.3 POLLUTION ROSES AND FREQUENCY DISTRIBUTION ANALYSES**

Pollution roses are shown in **Figure 8** and the frequency distributions are shown in **Figure 9**. The pollution roses and frequency distributions represent the distribution of wind direction temporally correlated with PM<sub>2.5</sub> and PM<sub>10</sub> concentrations at the on-site (Electrical Substation) and off-site monitors (roof of Neptune Office Building and pole mounted at 618 2<sup>nd</sup> St. East) for 2020.

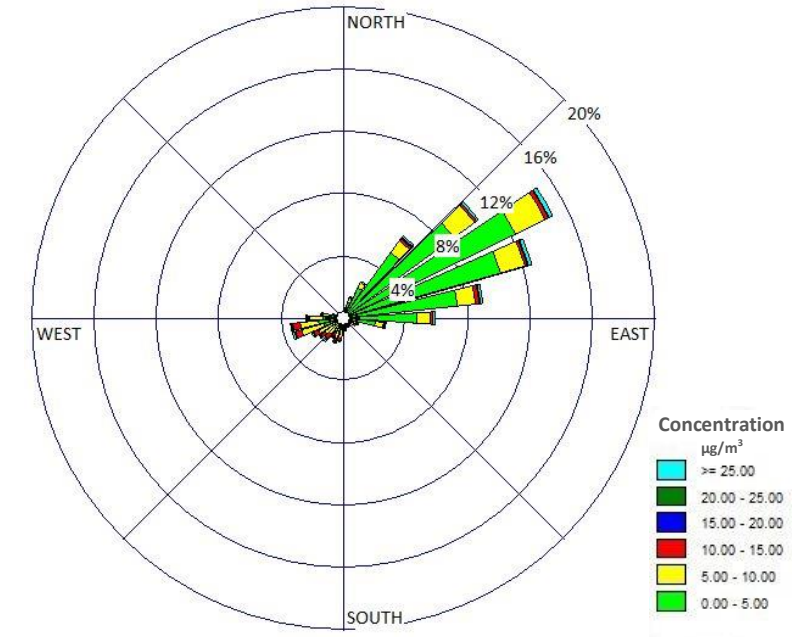
It should be noted that there was heavy construction around the neighbourhood pole monitor (618 2<sup>nd</sup> St. East) during 2020.



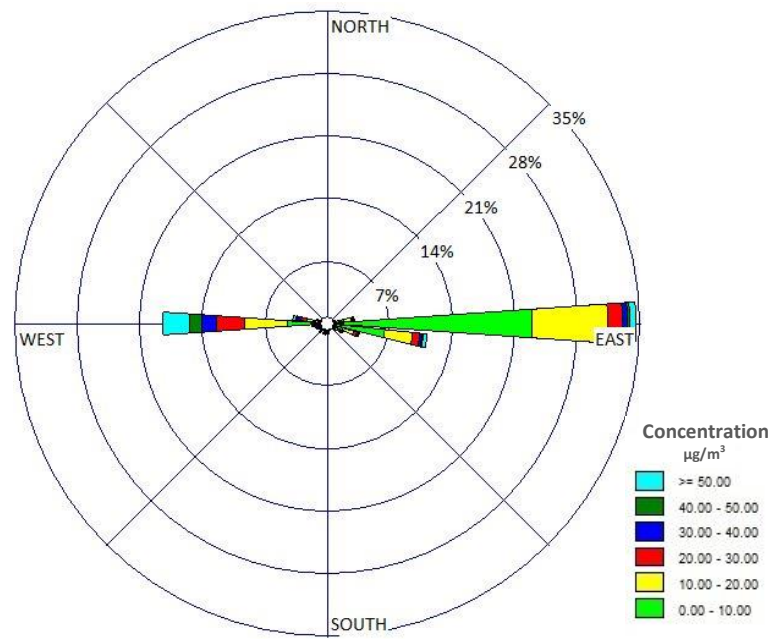
PM<sub>2.5</sub> Pollution Rose at Neptune Electrical Substation



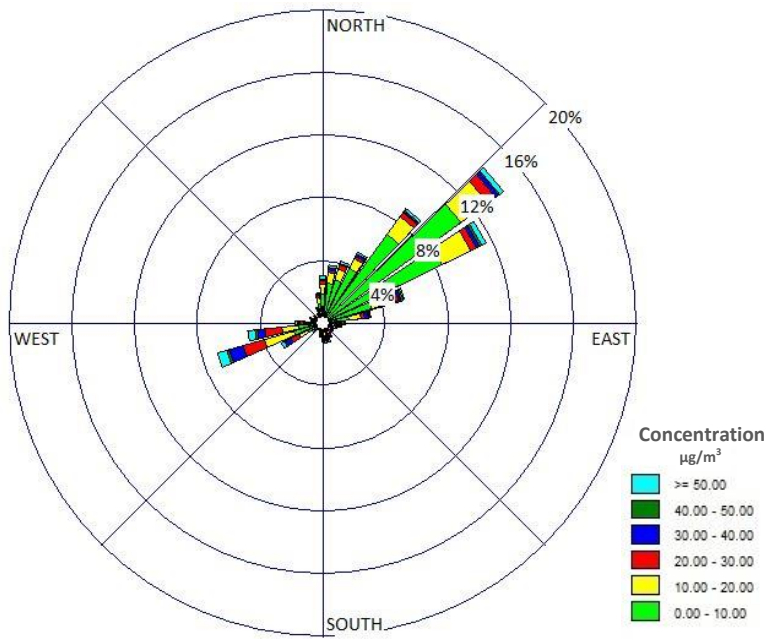
PM<sub>2.5</sub> Pollution Rose at Neighbourhood Pole (618 2<sup>nd</sup> St. East)



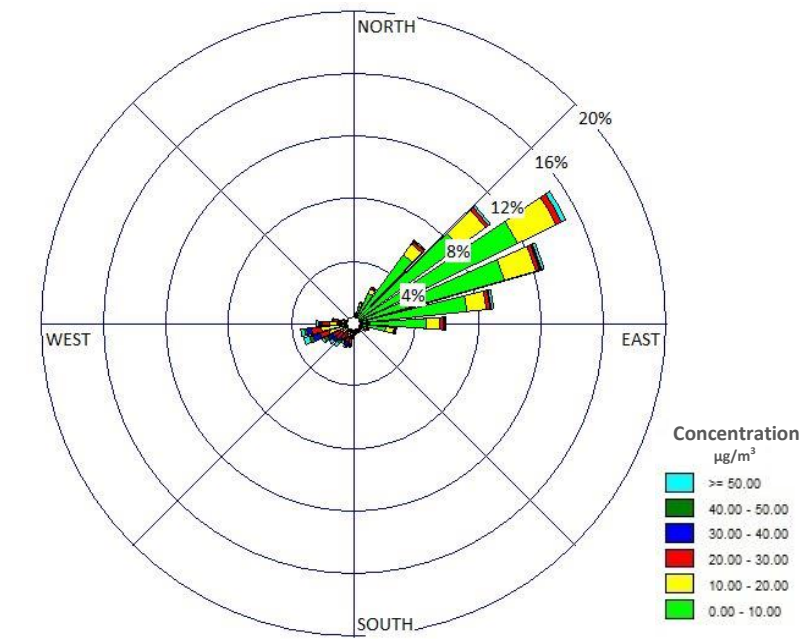
PM<sub>2.5</sub> Pollution Rose at Neptune Office Building (340 Brooksbank Ave.)<sup>(a)</sup>



PM<sub>10</sub> Pollution Rose at Neptune Electrical Substation



PM<sub>10</sub> Pollution Rose at Neighbourhood Pole (618 2<sup>nd</sup> St. East)



PM<sub>10</sub> Pollution Rose at Neptune Office Building (340 Brooksbank Ave.)

Figure 8: Pollution roses (direction wind blowing from) at on-site and off-site monitoring stations for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020

Note: Scales are not consistent between wind roses.



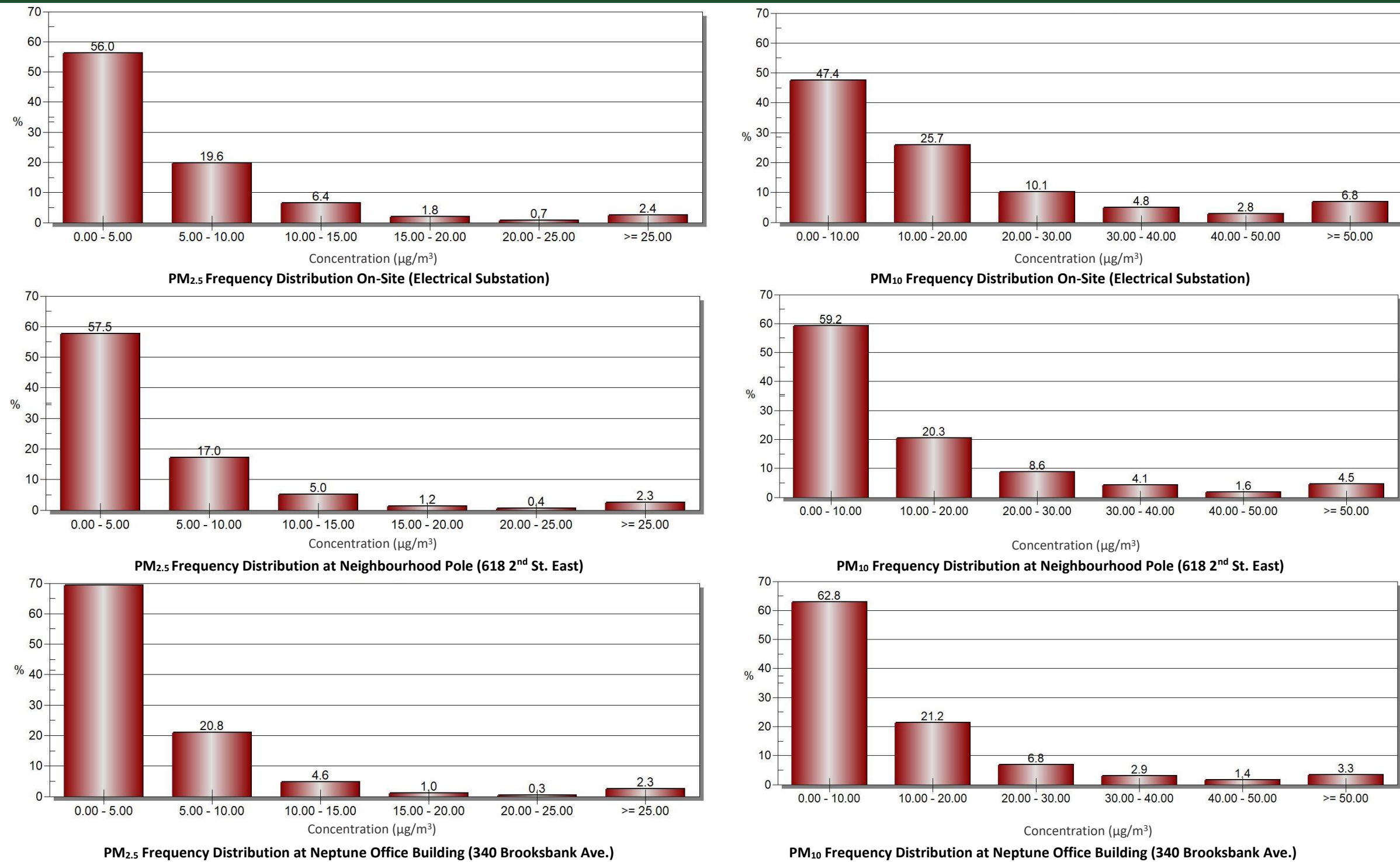


Figure 9: Frequency distributions at on-site and off-site monitoring stations for Jan 1<sup>st</sup> – Dec 31<sup>st</sup>, 2020