QUARTERLY NEPTUNE AIR PERMIT REPORTING

NEPTUNE BULK TERMINALS LTD.

Reporting Period: 2022 – Quarter 1

envirochem

Neptune TERMINALS

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1 BACKGROUND

To meet Metro Vancouver Air Permit GVA0081 (issued September 23rd, 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 23rd, 2016).

This report includes quarterly particulate matter monitoring reporting requirements.

2 QUARTERLY REPORTING

2.1 ON-SITE $PM_{2.5}$ AND PM_{10} MONITORING - 24-HR ROLLING AVERAGES

2.1.1 METHODOLOGY

Neptune is conducting continuous $PM_{2.5}$ and PM_{10} monitoring using two Met-One E-BAM Plus monitors on-site near the northwest boundary of Neptune Terminals on the roof of the terminal's electrical substation building.

Ambient Air Monitoring data for $PM_{2.5}$ and PM_{10} 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.

2.1.2 RESULTS

Using Neptune's data management system, Envirochem:

- Converts the vetted $PM_{2.5}$ and PM_{10} data to 24-hour rolling averages and performs QA/QC;
- On a quarterly basis, submits the graphs (**Figure** 1 and **Figure** 2) to Metro Vancouver.

During Quarter 1 of 2022, there were a few exceedances of the 24-hour PM_{10} AAQO at Neptune's on-site monitor (see **Figure 2**). No exceedances of the $PM_{2.5}$ AAQO were observed.

To investigate the attributable particulate to the PM_{10} exceedances:

- Wind speed and direction during hours with PM_{10} concentrations at or above 50 $\mu g/m^3$ were analyzed (**Figure 3**).

Results and findings are summarized below.

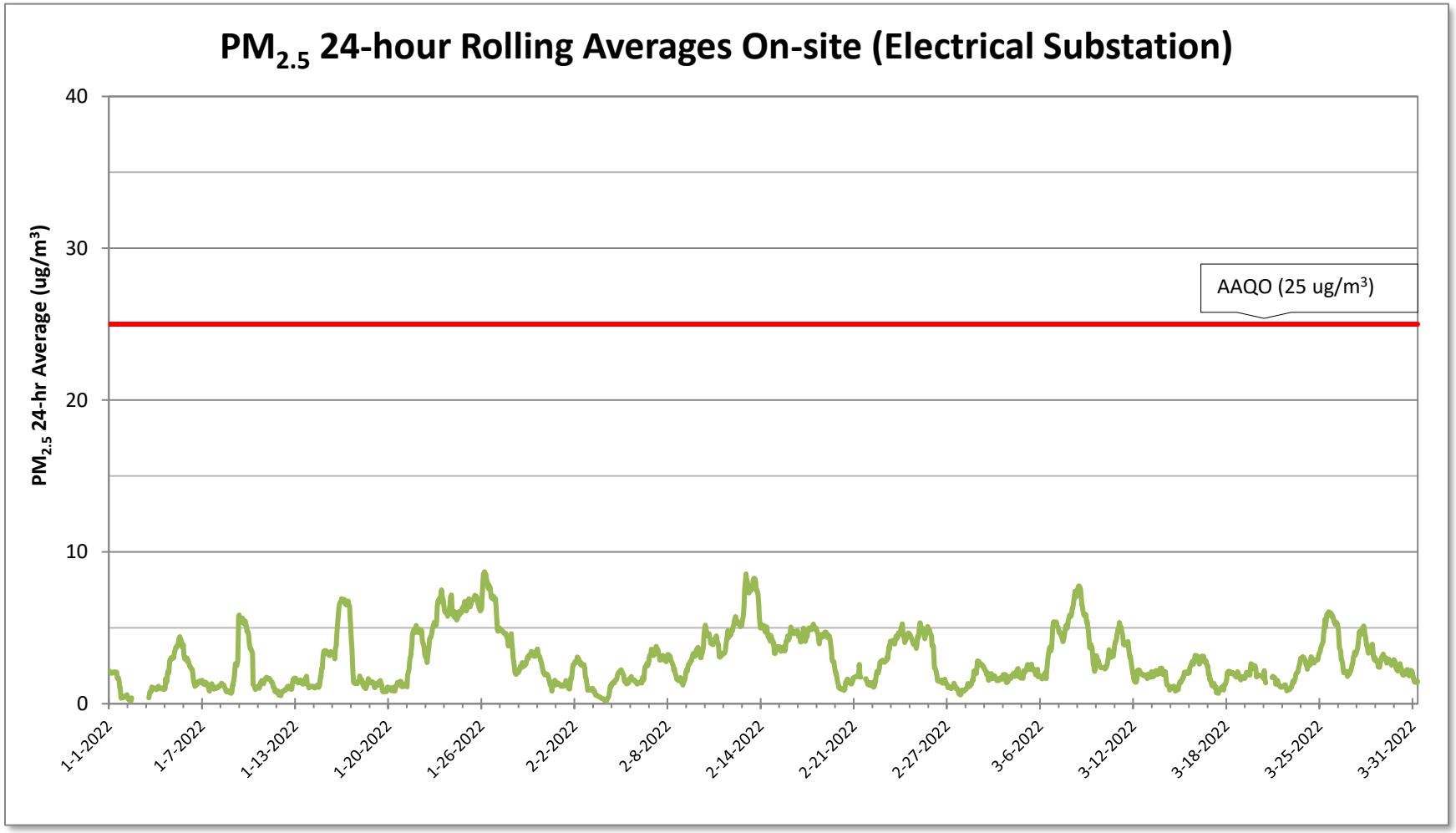

Figure 1: 24-hour rolling averages of $PM_{2.5}$ data from on-site monitor for the first calendar quarter 2022 (January 1st to March 31st, 2022)

Note: Blank space indicates that no data is available due to power failure or instrument maintenance.

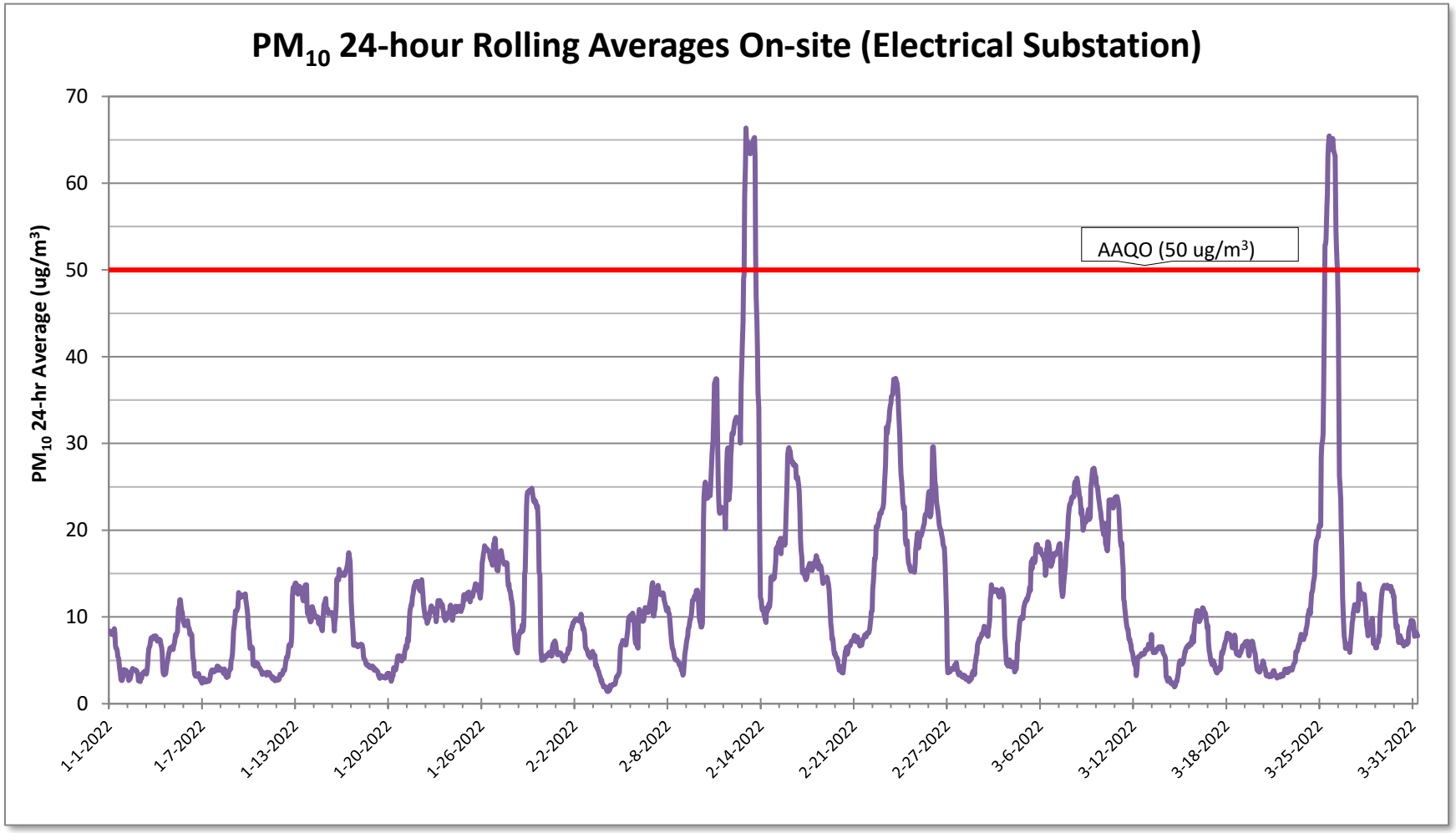

Figure 2: 24-hour rolling averages of PM_{10} data from on-site monitor for the first calendar quarter 2022 (January 1st to March 31st, 2022)

Note: Blank space indicates that no data is available due to power failure or instrument maintenance.

2.1.3 WIND ANALYSIS

To investigate the attributable particulate to the observed PM_{10} exceedances, wind speed and direction during hours of those events with hourly average PM_{10} concentrations of 50 µg/m^3 or greater were analyzed. 50 µg/m^3 was conservatively chosen as it is the 24-hour AAQO for PM_{10}. Hence, hours with 50 µg/m^3 PM_{10} or above were considered to have a possible contribution to the AAQO exceedances. As can be seen in **Figure 3**, during hours with 50 µg/m^3 PM_{10} or higher, the predominant winds were from the west with calm conditions.

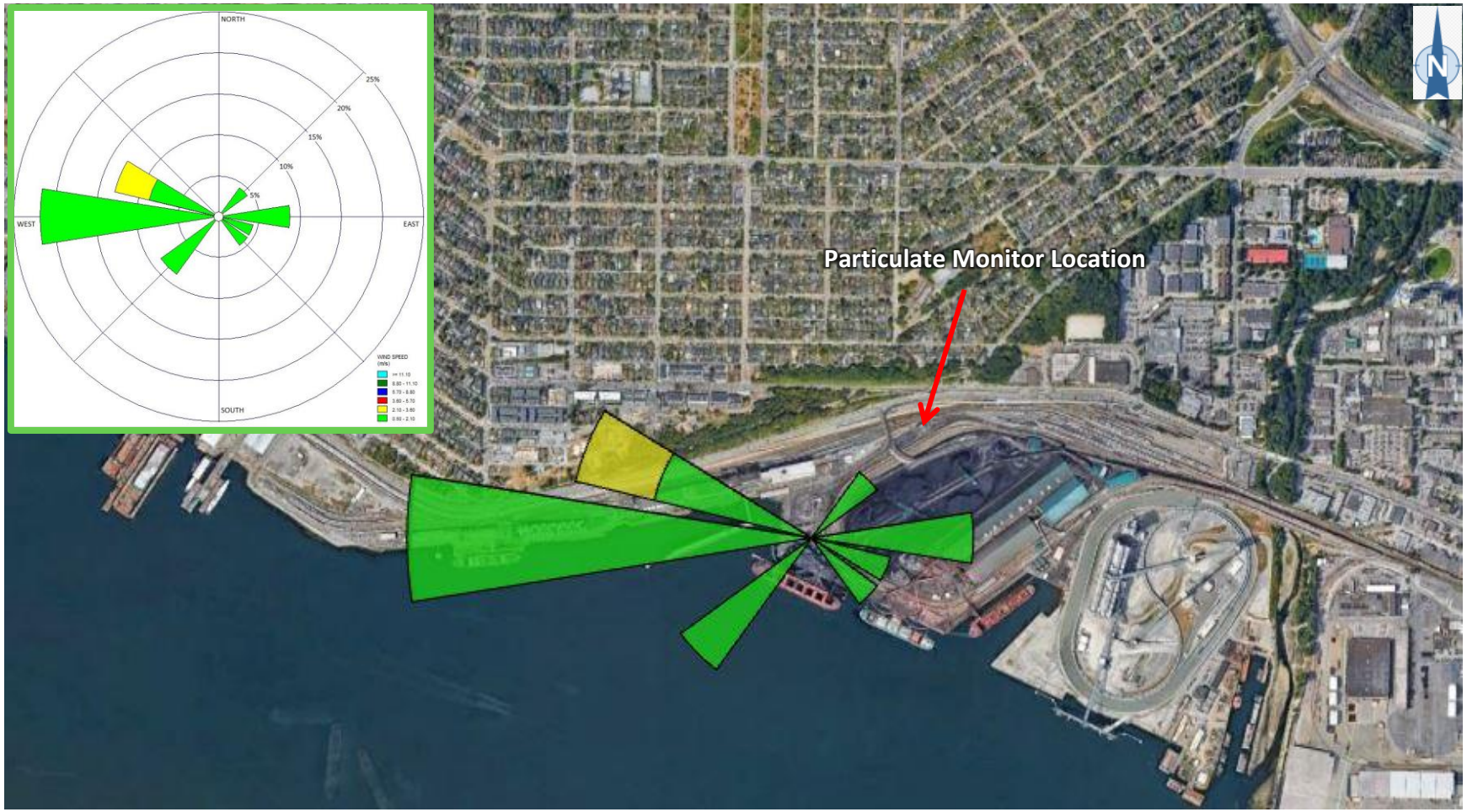

Figure 3: Wind rose during hours contributing to PM_{10} 24-hr rolling average AAQO exceedance with PM_{10} concentrations greater than 50 µg/m^3 for the first calendar quarter (January 1st to March 31st, 2022)
Note: The presented wind rose is based on "winds blowing from"

2.2 OFF-SITE PM_{10} AND $PM_{2.5}$ MONITORING - 24-HOUR ROLLING AVERAGE EXCEEDANCES OF PM_{10} AND $PM_{2.5}$ FROM AAQO

2.2.1 METHODOLOGY

Neptune is conducting continuous $PM_{2.5}$ and PM_{10} monitoring off-site from the terminal at these two locations (in the neighbouring areas):

- To the northeast of the Neptune Terminals, on the roof of 340 Brooksbank Avenue (Neptune's office) equipped with a PM_{10} monitor (Met One E-BAM Plus) and a $PM_{2.5}$ monitor (SHARP 5030i).
    - ***Please note: due to roof maintenance/repairs at this location, the PM_{10} monitor has been temporarily relocated to the nearby roof of 1327 Keith Road East (Carlton Tower) where Neptune also operates a $PM_{2.5}$ monitor (SHARP 5030i).***
- To the northwest of the Neptune Terminals in the residential area at 618 2nd Street East using two pole mounted $PM_{2.5}$ and PM_{10} monitors (Met One E-BAM Plus).

Ambient Air Monitoring data for $PM_{2.5}$ and PM_{10} is 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.

2.2.2 RESULTS

Using Neptune's data management system, Envirochem:

- Converts the vetted $PM_{2.5}$ and PM_{10} data to 24-hour rolling averages;
- Retrieves the quarterly 24-hour rolling averages from Neptune's database;
- Identifies and flags any 24-hour rolling averages which exceed Metro Vancouver Ambient Air Quality Objectives (AAQOs) for $PM_{2.5}$ and PM_{10};
- On a quarterly basis, tabulates all exceedances (**Table 1**) and submits them to Metro Vancouver.

Table 1: Off-Site 24-hour rolling average $PM_{2.5}$ and PM_{10} AAQO exceedances for the first quarter (January 1st to March 31st, 2022)

METRO VANCOUVER PERMIT GVA 0081	
Neptune Bulk Terminals (Canada) Ltd.	
OFF-SITE 24-HR ROLLING AVERAGE $PM_{2.5}$ AND PM_{10} AAQO EXCEEDANCES	
Reporting Period:	**January 1st - March 31st, 2022**

Exceedance Event	MV AAQO		Carlton Tower* (1327 Keith Road East)	Neighbourhood pole (618 E 2nd St.)
	Contaminant	µg/m³	Period of Exceedance	
1	$PM_{2.5}$	25	No exceedances observed in Q1 of 2022	
	PM_{10}	50		

**As notified in correspondence with Metro Vancouver dated June 22nd, 2021, $PM_{2.5}$ and PM_{10} units were temporarily taken down at 340 Brooksbank Avenue on June 25th due to required rooftop maintenance/repairs announced by the building's landlord. $PM_{2.5}$ data after June 25th was retrieved from the nearby $PM_{2.5}$ station at the Carlton Tower building (located at 1327 Keith Road East) that is operated by Neptune as part of a due diligence program and outside of the scope of their Ambient Air Monitoring Program. This station is close to 340 Brooksbank Avenue and in the same direction from the Neptune terminal. As notified in correspondence with Metro Vancouver dated July 29th, 2021, the PM_{10} monitor operated at 340 Brooksbank Avenue under the Ambient Air Monitoring Program has been temporarily relocated since July 9th to the rooftop of the Carlton Tower building to operate alongside the $PM_{2.5}$ instrument and maintain the coherence of the PM_{10} dataset.*