# Northern Bus Garage
# Noise, Vibration, and Dust Monitoring Report (October 2023)

Noise, Vibration, and Dust levels were monitored as part of the reconstruction of Northern Bus Garage, 4615 14th Street, NW, Washington, DC, for the month of October 2023.

The following memorandum identifies the monitoring points and instruments, presents the data, and provides a brief analysis of the results per monthly monitoring report attached by Geo Instruments for Clark Construction. The report is organized by medium: noise, vibration, and dust. Figures and graphs are attached. The red dashed line on each of the graphs represents the monitoring thresholds, which are summarized below for each instrument.

**Noise Monitoring**

Five noise monitors are positioned around the perimeter of the project site. (See Figure 1) Under DC regulations, the regulatory standard is 80 dBA, measured 25 ft from the property line (20 DCMR 2802.1). Because the noise monitoring devices are placed on the property line (rather than a 25 ft offset), the monitoring threshold for site activities is adjusted to 85 dBA (assuming the noise level will dissipate). Noise levels and vibration levels were measured automatically with Micromate and Geophone Instrument.

A detailed review of the data while compiling this months report revealed that the Mic5 hardware required evaluation, and was replaced.

numerous noise level exceedances at all hours of the day and all days of the week. Mic2 recorded the highest noise levels of any location after working hours and during work hours. Mic1 and Mic2 were like one another with 39% and 44% of the exceedances coming outside of working hours, respectively. Mic3 and Mic4 were also similar to each other with about 33% of its exceedances outside of working hours. Mic5 recorded 47% of its exceedances during nights and weekends. Please see table 1 (The "Work Hours" category includes all weekend shifts and evening shifts that were worked during the month).

**Vibration Monitoring**

Five vibration monitors are positioned around the perimeter of the project site. (See Figure 1) Vibration thresholds are based the WMATA Design Criteria. Monitors VM-1 and VM-2 are set at a lower vibration threshold due to their proximity to the historic façade, which is more sensitive to any movement. Noise levels and vibration levels were measured automatically with Micromate and Geophone Instrument.

**Table 2**

| Instrument Type | Monitoring Threshold |
|---|---|
| Vibration Monitor (VM-1) | 0.2 in/sec |
| Vibration Monitor (VM-2) | 0.2 in/sec |
| Vibration Monitor (VM-3) | 2.0 in/sec |
| Vibration Monitor (VM-4) | 2.0 in/sec |
| Vibration Monitor (VM-5) | 2.0 in/sec |

No operating issue with the monitoring instruments was identified. The seismographs at locations VM-1, VM-3, VM-4, and VM-5 were due for annual calibration. These were exchanged with newly calibrated units.

Graphs showing monitoring results are presented in Graphs 1 to 5.

No vibration exceedance was reported during the month.

**Dust Monitoring Threshold Values and Exceedances:**

Three dust monitors are positioned at the project site. (See Figure 2) EPA regulatory thresholds are based on a 24-hour

monitoring period; the project has adopted thresholds to monitor site levels and provide an indication of when EPA standards might be exceeded. (See Table 3) Dust measurements were monitored using Aeroqual Dust Sentry Pro.

**Table 3**

| Dust Monitoring Measurement | Monitoring Threshold |
|---|---|
| Particulates (PM2.5) | 40 µg/$m^3$ |
| Particulates (PM10) | 50 µg/$m^3$ |

DM2 began experiencing power interruptions after a battery exchange on October 19. It was discovered that the battery was not holding a charge above 11 volts resulting in interruptions in overnight measurements. The faulty battery was removed and replaced with a fresh battery. Two of the units have been fitted with hardware that allows tracking and alarming upon low voltage. Due to site restrictions, DM1 cannot be plugged into main power so continued battery swaps will be the interim solution until site conditions change.

Graphs showing monitoring results are presented in Graphs 6-11.

There was one air quality exceedances in the month of October 2023. DM1 recorded a PM2.5 of 50 µg/m^3 and a PM10 of 54 µg/m^3 on October 27 at 6:32pm due to higher winds in the evening.

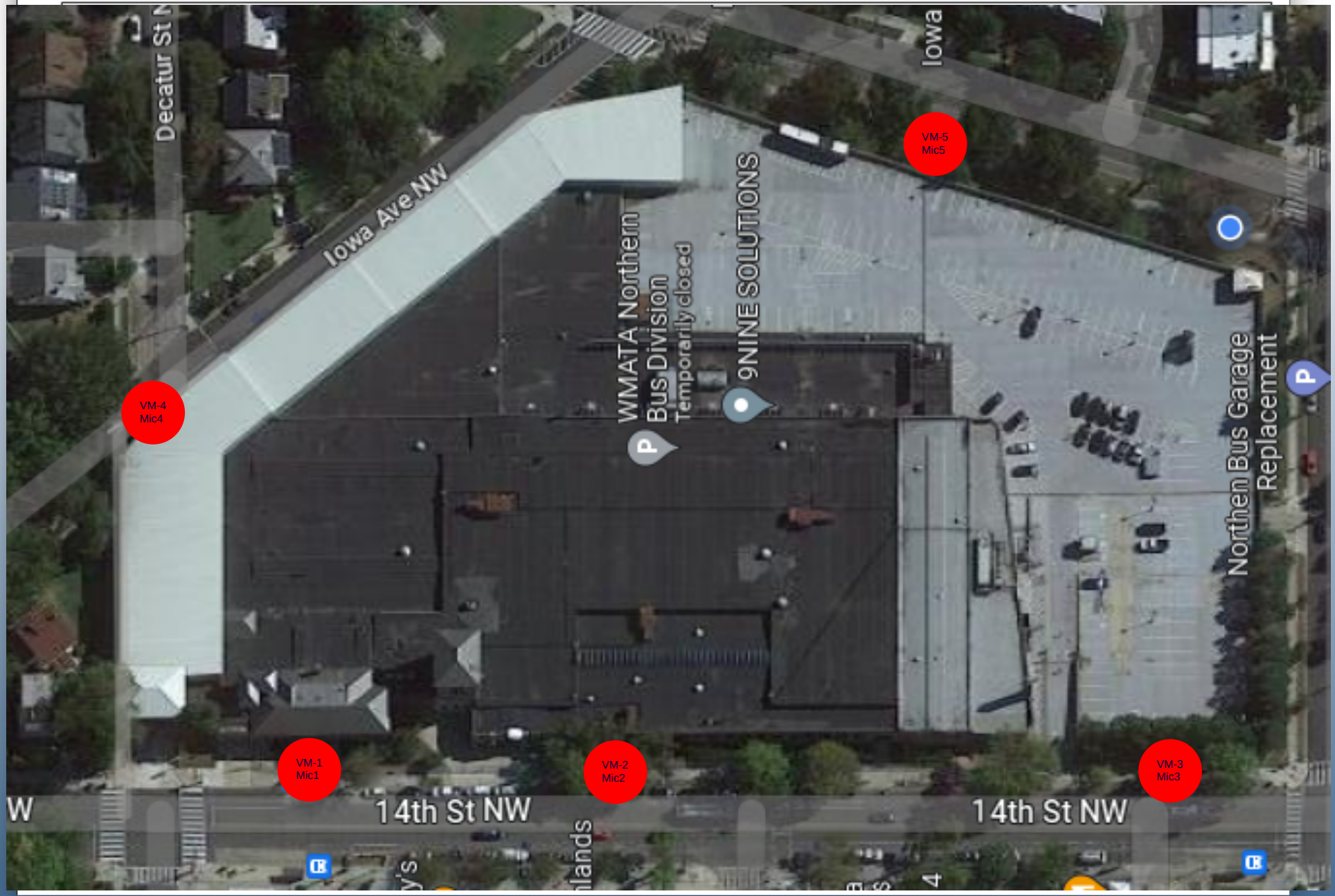

# Monitoring Report

## WMATA Bus Garage Monthly Report

## October 2023

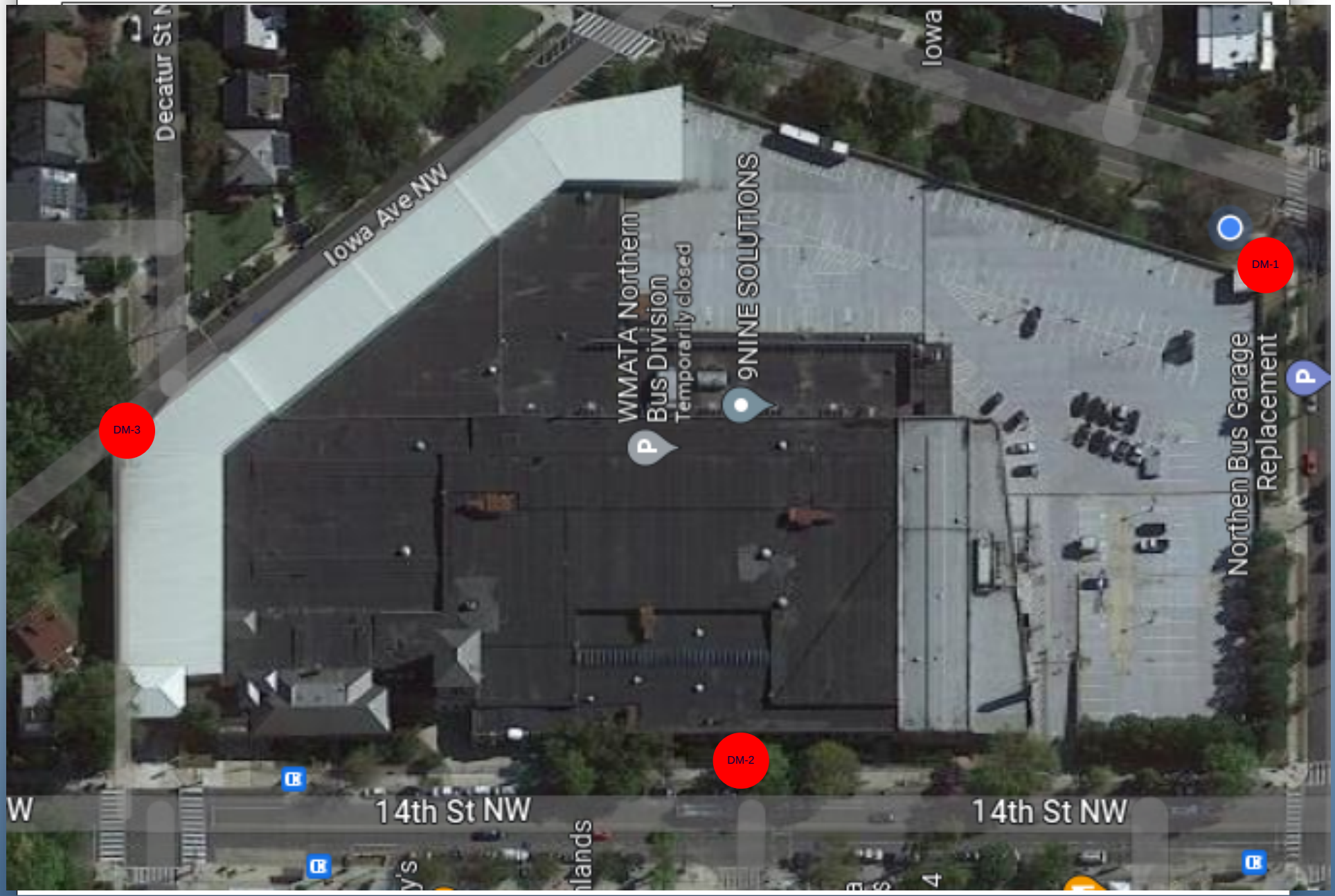
# Figure 1: Vibration and Noise Monitor Location Plan

16/06/2023, 13:43:04



# Figure 2: Dust Monitor Location Plan





# Table 1: Noise Summaries

**VM-1 Mic**

| VM1-MIC | | |
|---|---|---|
| | Exceedance | Percentage |
| Work hours | 601 | 61.45% |
| After hours | 157 | 16.05% |
| Weekends | 220 | 22.49% |
| Total | 978 | 100% |

| | Work hours | After hours | Weekends |
|---|---|---|---|
| Lmax | 111.3 | 109.3 | 107.3 |
| Lmin | 72.3 | 55.9 | 55.6 |
| L10 | 87 | 73 | 74 |
| L90 | 74 | 62 | 61 |
| Leq | 81 | 78 | 77.8 |

**VM-2 Mic**

| VM2-MIC | | |
|---|---|---|
| | Exceedance | Percentage |
| Work hours | 187 | 56.67% |
| After hours | 68 | 20.61% |
| Weekends | 75 | 22.73% |
| Total | 330 | 100% |

| | Work hours | After hours | Weekends |
|---|---|---|---|
| Lmax | 115.7 | 115.7 | 112.7 |
| Lmin | 80 | 66.9 | 66.9 |
| L10 | 84 | 70 | 75 |
| L90 | 81 | 68 | 71 |
| Leq | 82 | 76.8 | 74.3 |

**VM-3 Mic**

| VM3-MIC | | |
|---|---|---|
| | Exceedance | Percentage |
| Work hours | 369 | 66.85% |
| After hours | 78 | 14.13% |
| Weekends | 105 | 19.02% |
| Total | 552 | 100% |

| | Work hours | After hours | Weekends |
|---|---|---|---|
| Lmax | 108.7 | 107.3 | 110.8 |
| Lmin | 67.2 | 50.5 | 57.6 |
| L10 | 85 | 73 | 75 |
| L90 | 74 | 56 | 63 |
| Leq | 78.7 | 76 | 80.4 |

**VM-4 Mic**

| VM4-MIC | | |
|---|---|---|
| | Exceedance | Percentage |
| Work hours | 56 | 67.47% |
| After hours | 11 | 13.25% |
| Weekends | 16 | 19.28% |
| Total | 83 | 100% |

| | Work hours | After hours | Weekends |
|---|---|---|---|
| Lmax | 98.9 | 100.7 | 100.6 |
| Lmin | 61.5 | 44.2 | 44.4 |
| L10 | 74 | 62 | 65 |
| L90 | 64 | 48 | 49 |
| Leq | 77.5 | 70.1 | 65 |

**VM-5 Mic**

| VM5-MIC | | |
|---|---|---|
| | Exceedance | Percentage |
| Work hours | 157 | 53.22% |
| After hours | 49 | 16.61% |
| Weekends | 89 | 30.17% |
| Total | 295 | 100% |

| | Work hours | After hours | Weekends |
|---|---|---|---|
| Lmax | 113.7 | 107.7 | 106 |
| Lmin | 91.3 | 90.9 | 90.8 |
| L10 | 92 | 91 | 91 |
| L90 | 92 | 91 | 91 |
| Leq | 91.5 | 91.1 | 90.8 |

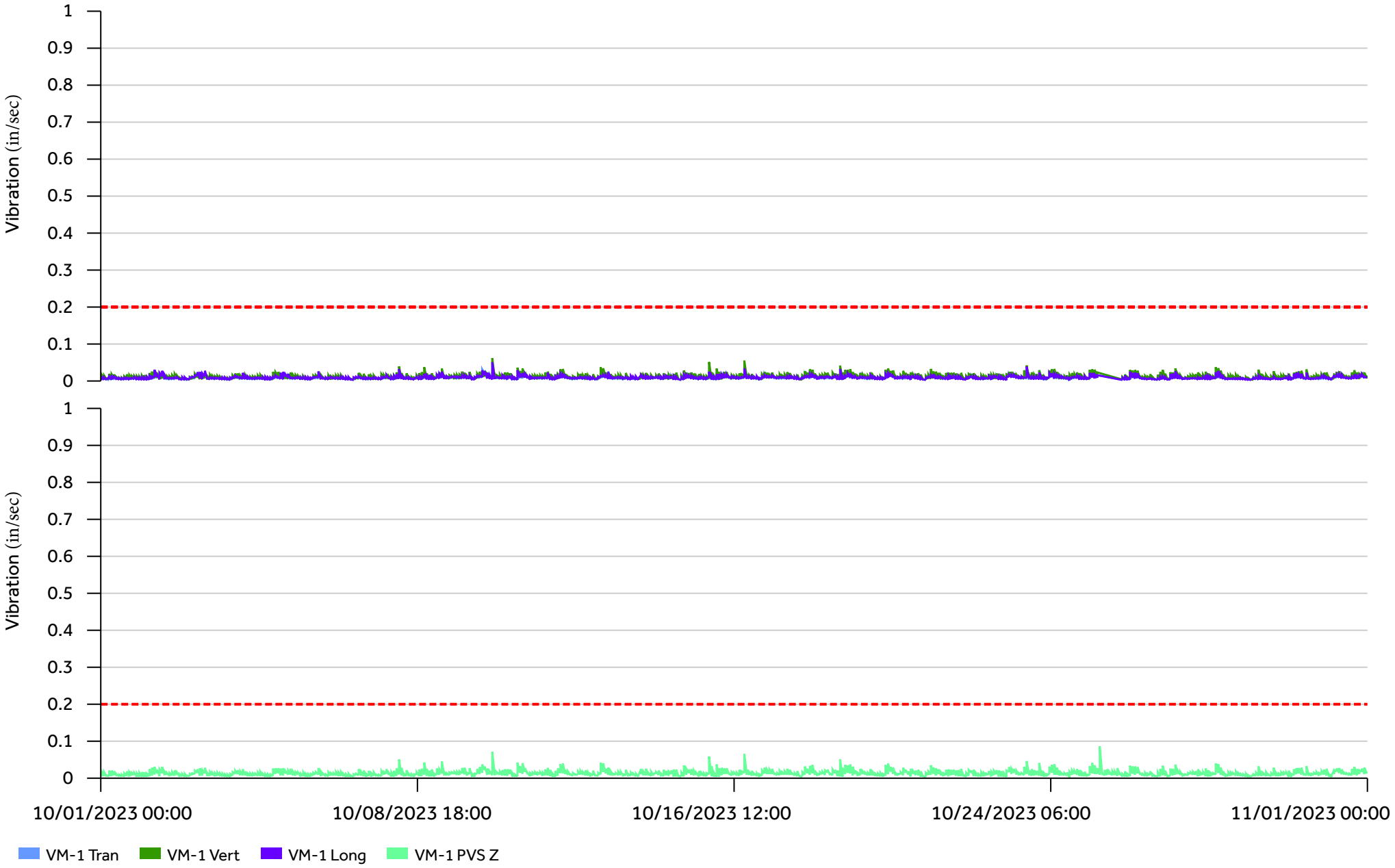
**NOTES:**

1. Exceedance analyses are presented in the left table. Noise level summaries are presented in the right table.

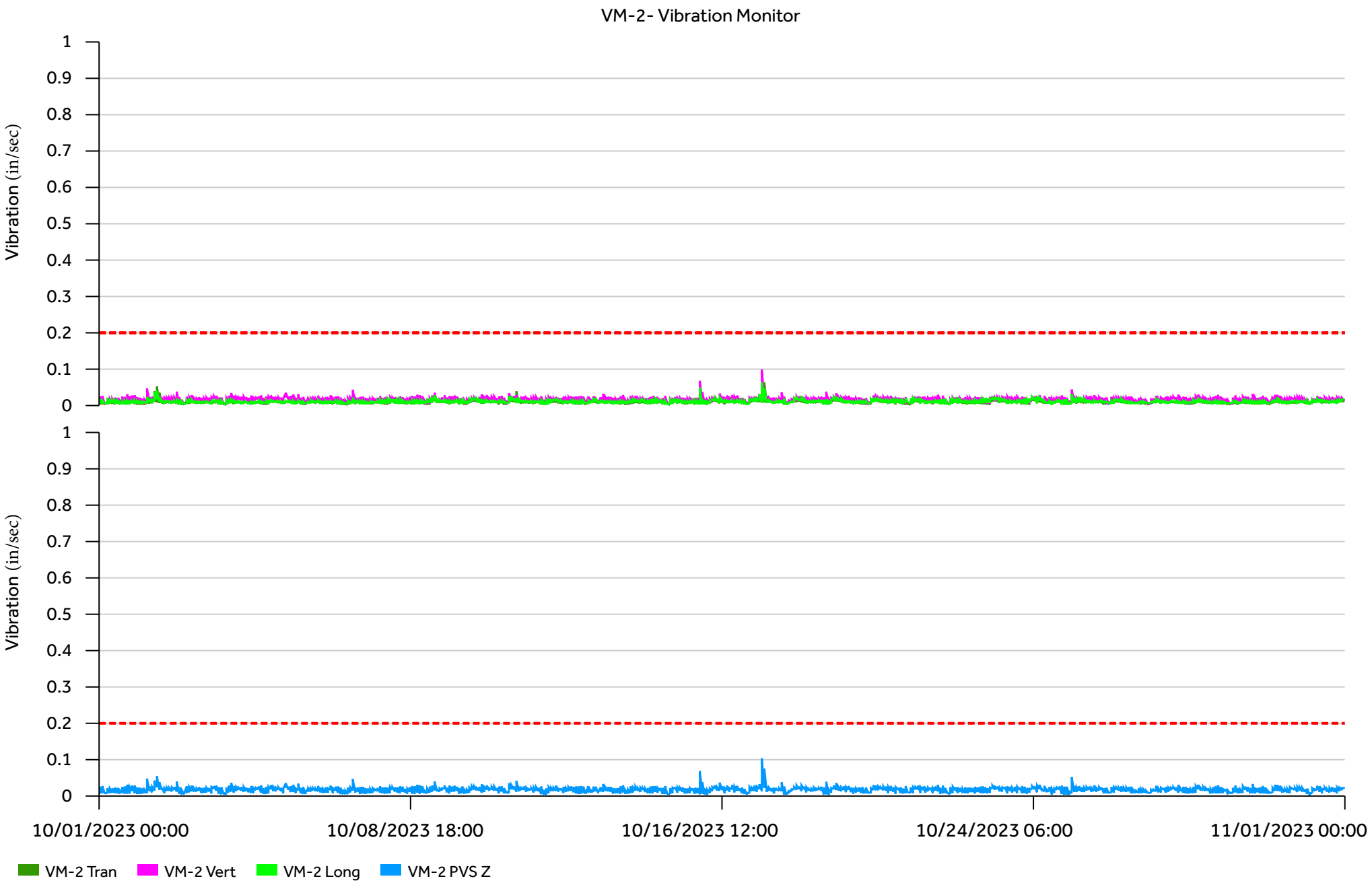
2. Measurements and Key:
Lmax: Maximum Noise Level (for the month, in dBA)
Lmin: Maximum Noise Level (for the month, in dBA)
L10: The noise level exceeded 10% of the time (for the month, in dBA)
L90: The noise level exceeded 90% of the time (for the month, in dBA)
Leq: Equivalent Continuous Sound Level, an 'average ' (for the month, in dBA)

Graph 1:

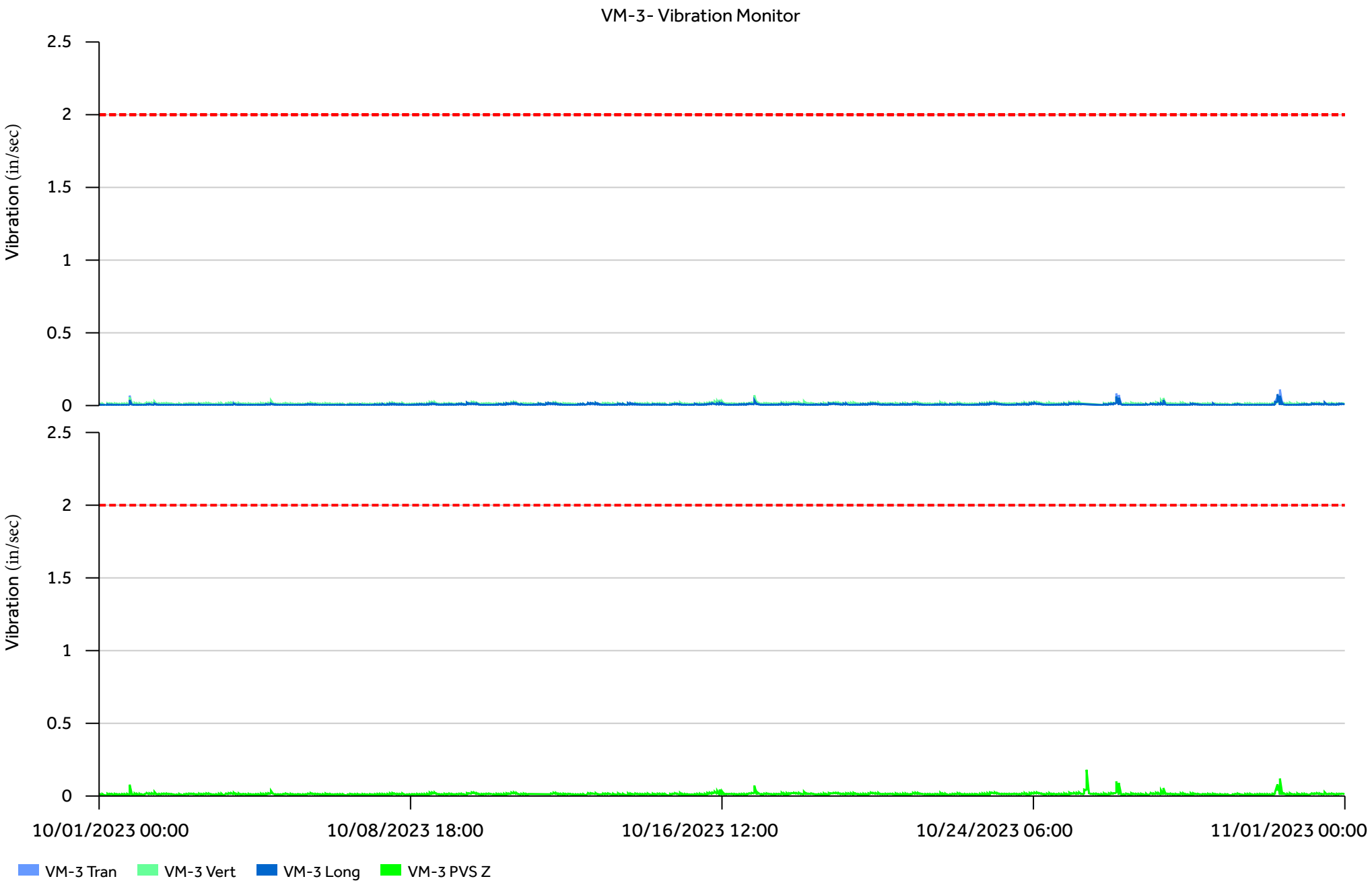
VM-1- Vibration Monitor



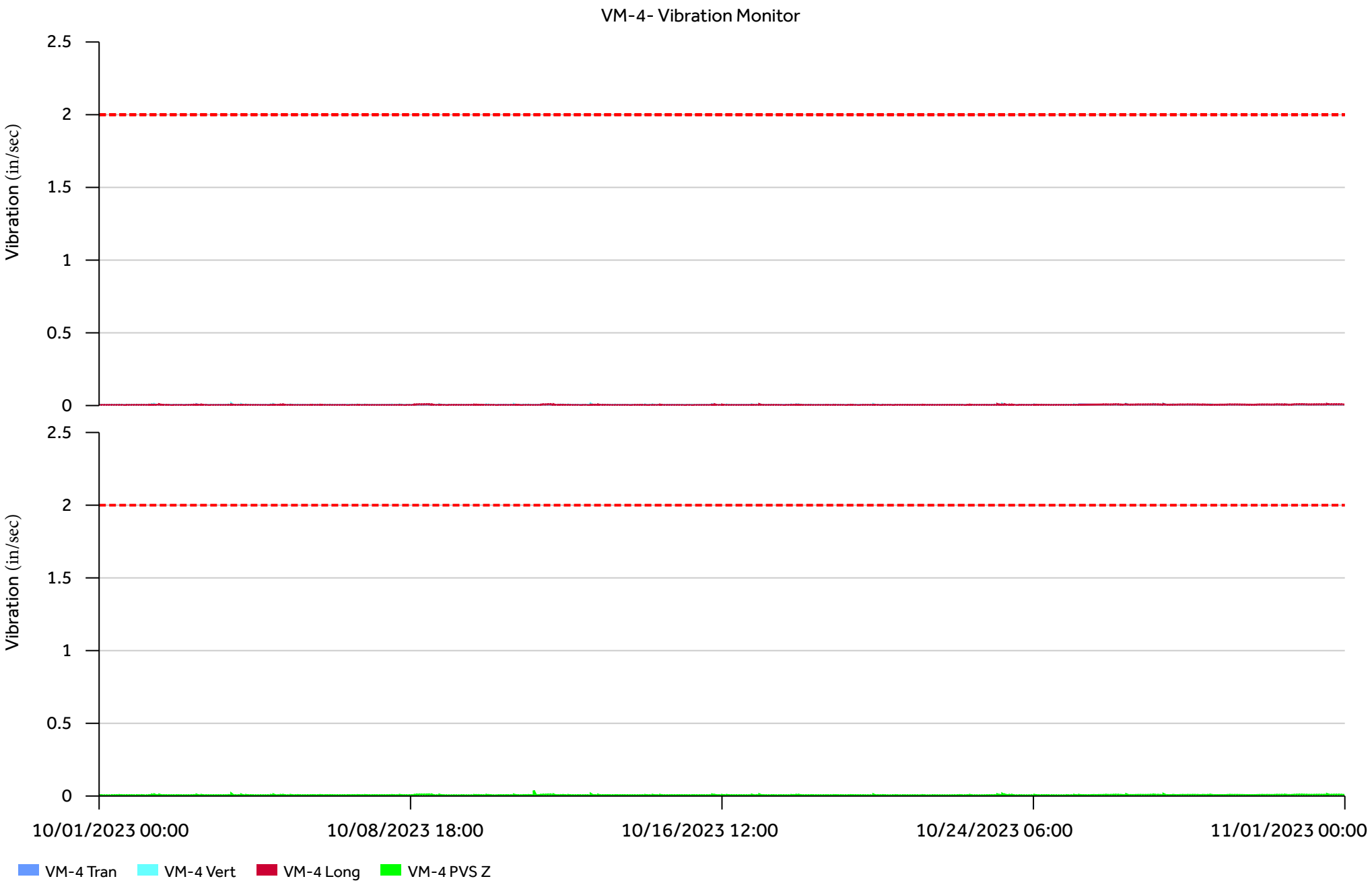
Graph 2:


VM-2- Vibration Monitor
Vibration (in/sec)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Vibration (in/sec)
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
VM-2 Tran
VM-2 Vert
VM-2 Long
VM-2 PVS Z

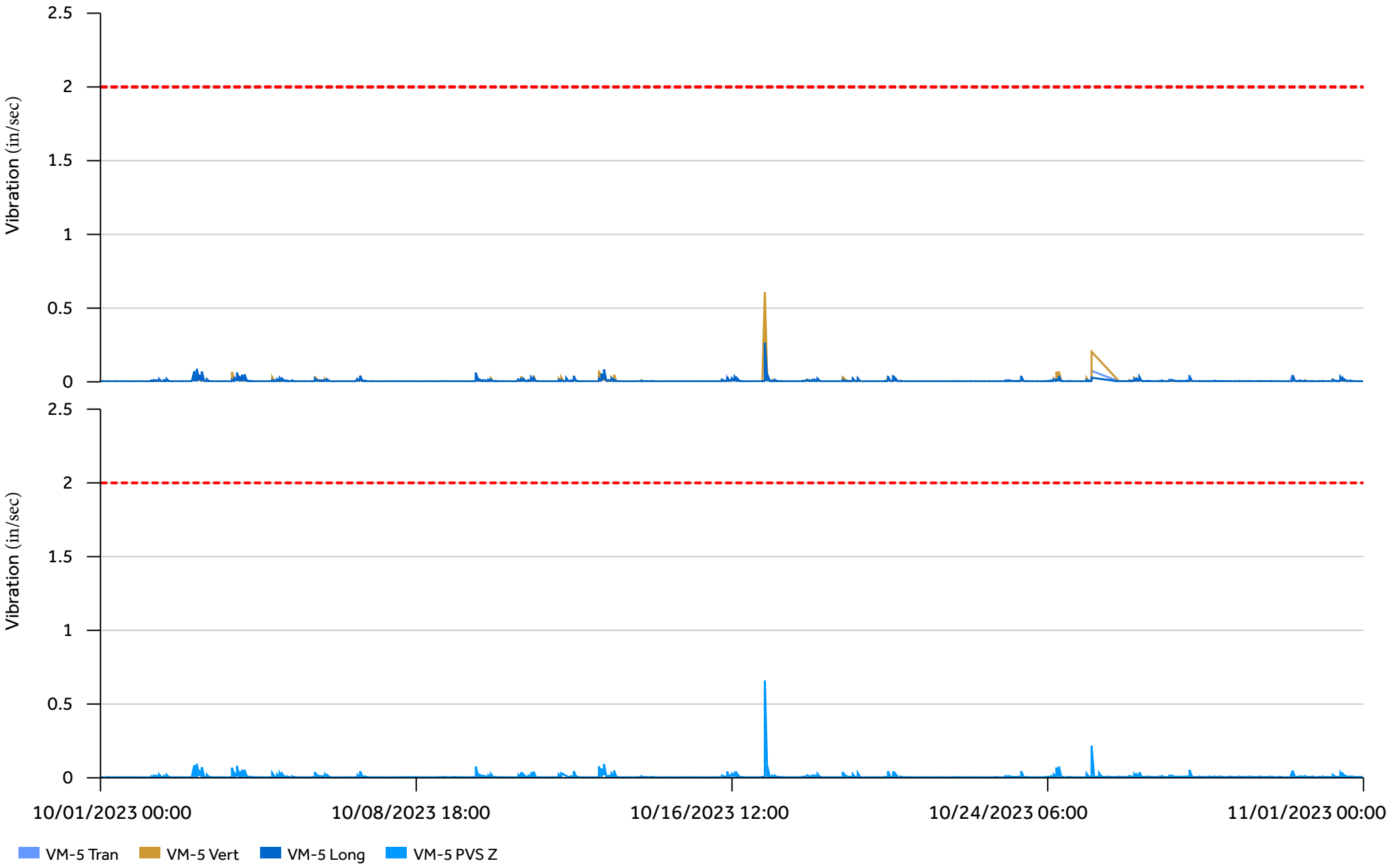
Graph 3:


VM-3- Vibration Monitor
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
VM-3 Tran
VM-3 Vert
VM-3 Long
VM-3 PVS Z

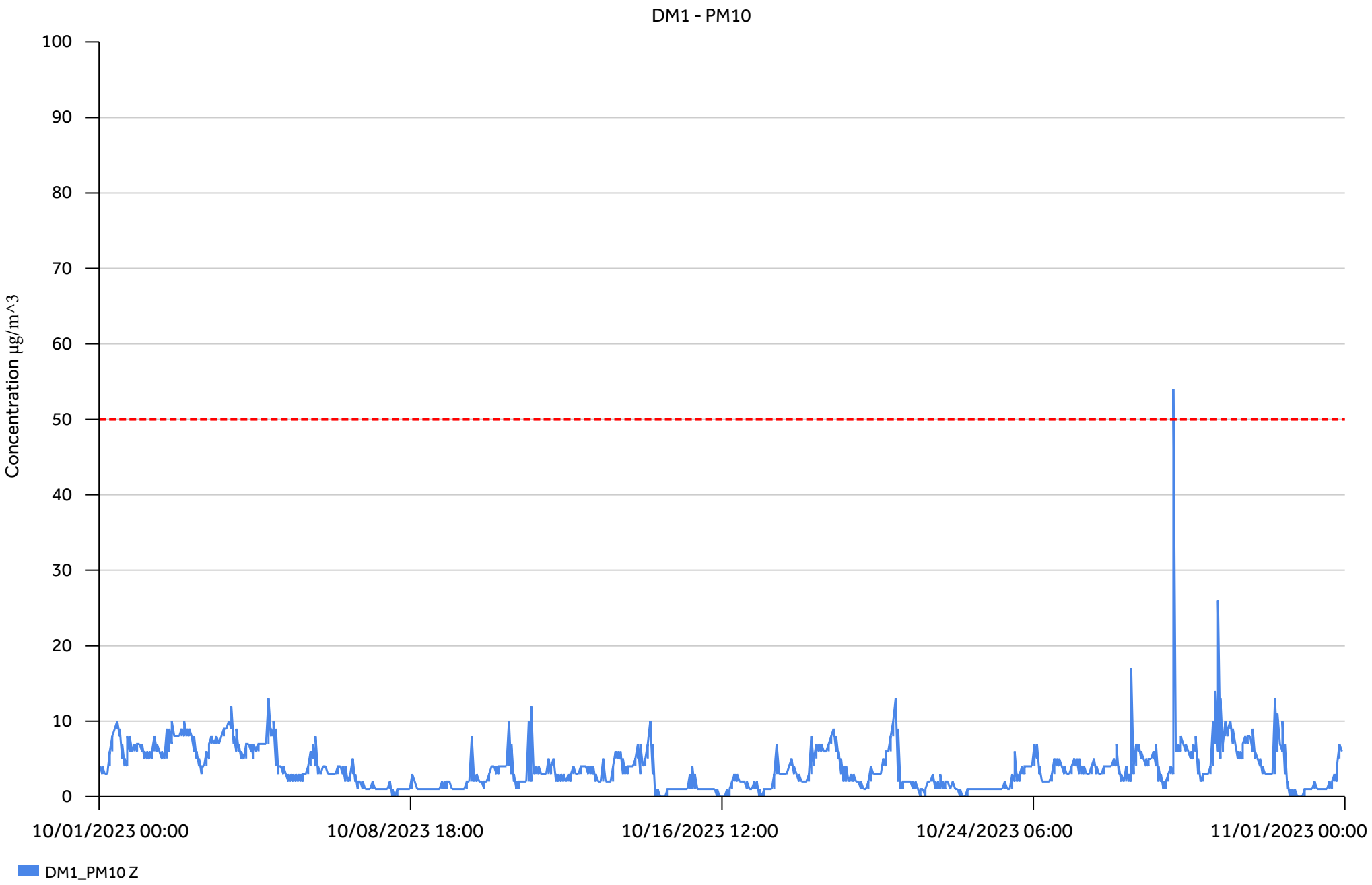
Graph 4:


VM-4- Vibration Monitor
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
VM-4 Tran
VM-4 Vert
VM-4 Long
VM-4 PVS Z

Graph 5:

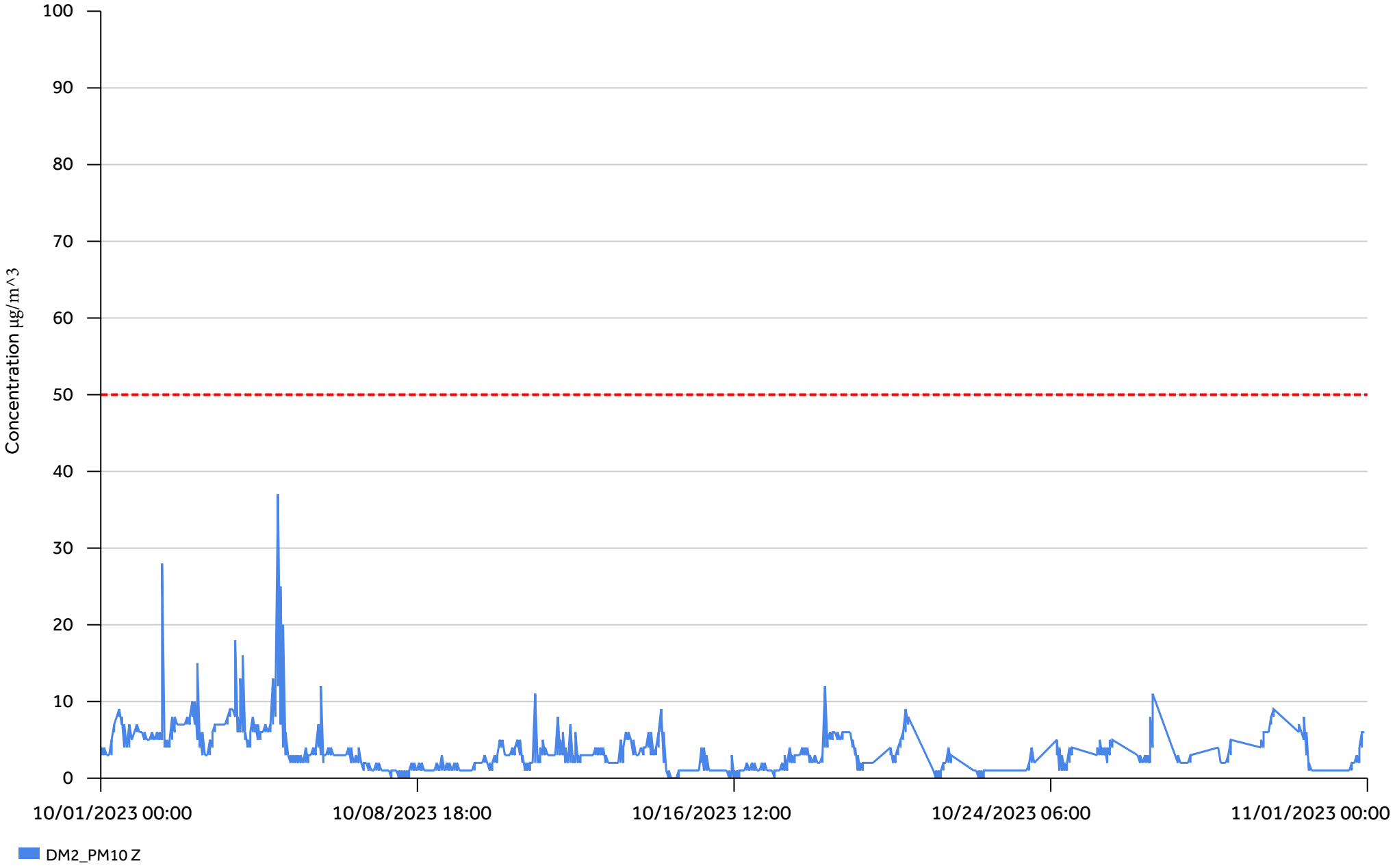

VM-5- Vibration Monitor
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
VM-5 Tran
VM-5 Vert
VM-5 Long
VM-5 PVS Z

Graph 6:

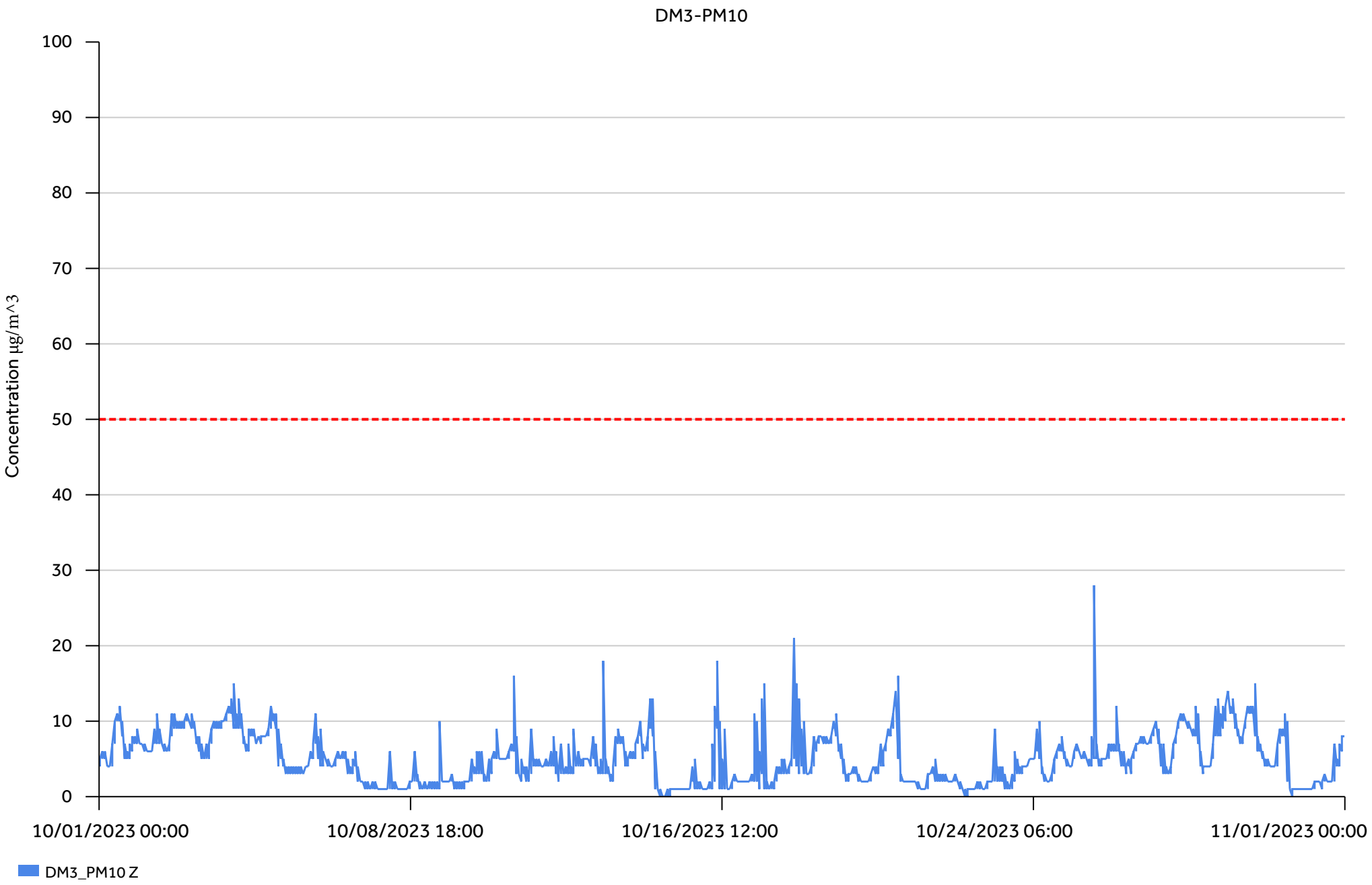

DM1 - PM10
100
90
80
70
60
50
40
30
20
10
0
Concentration µg/m^3
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
DM1_PM10 Z

Graph 7:

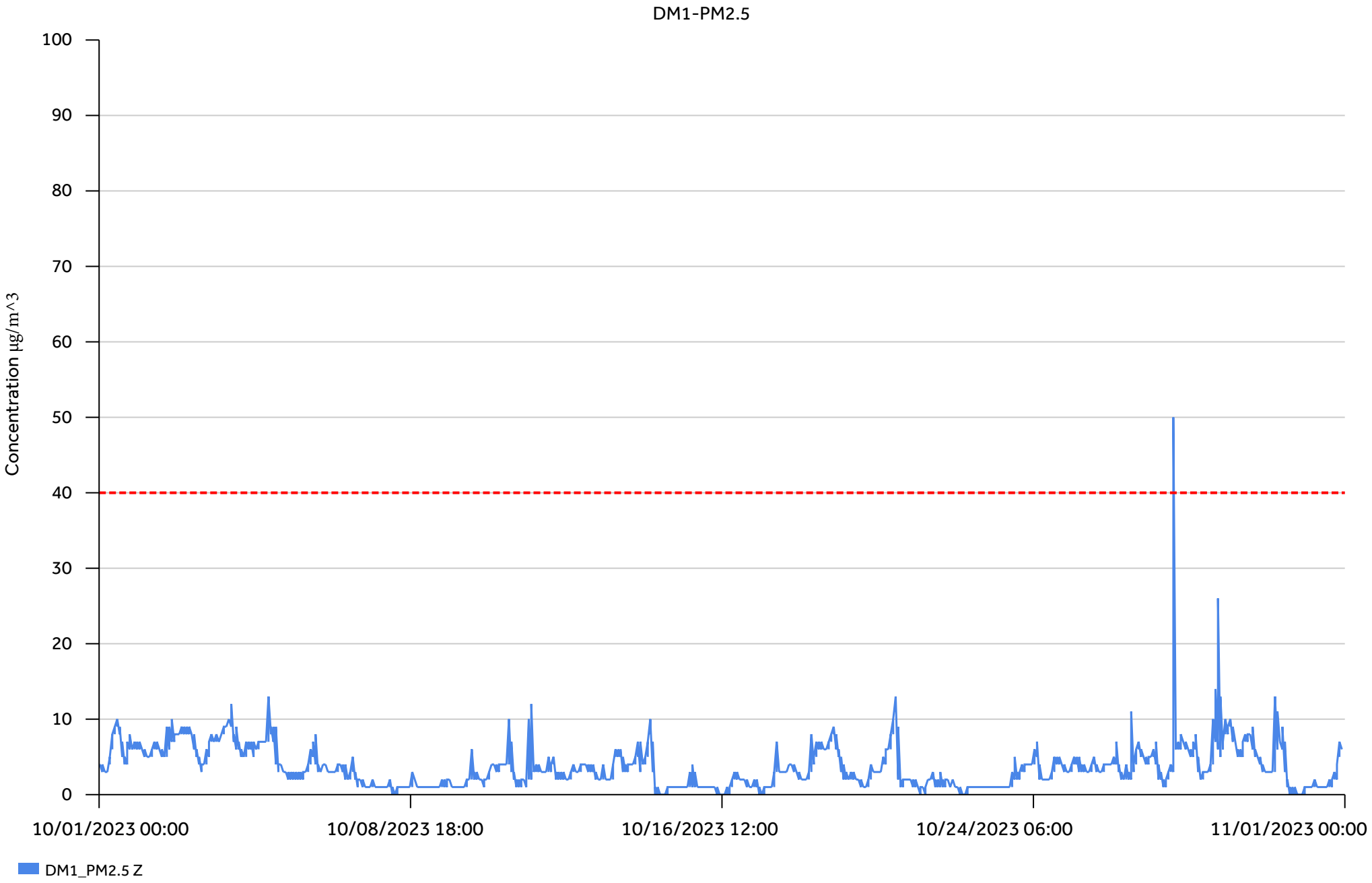
DM2-PM10



Graph 8:

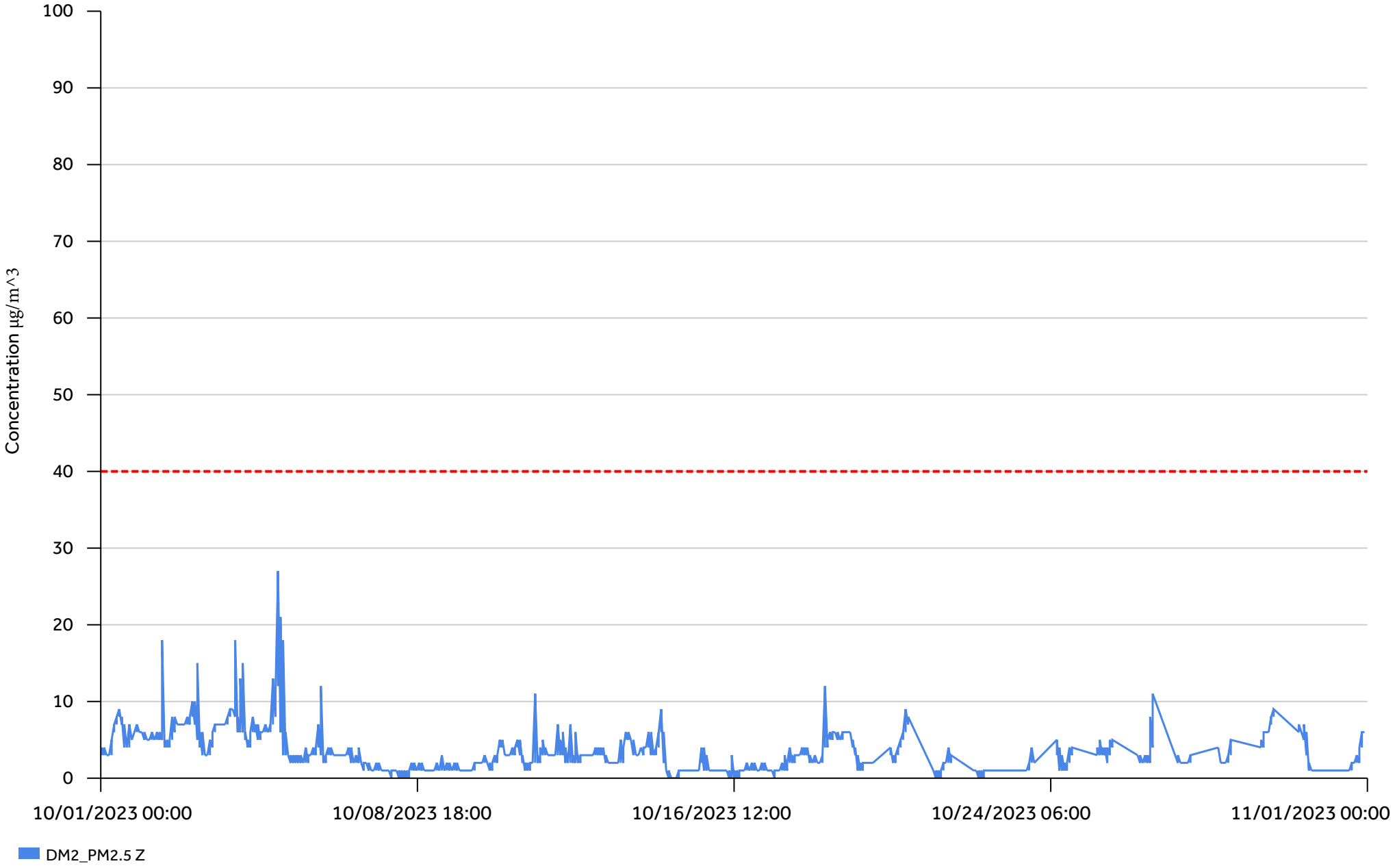

DM3-PM10
100
90
80
70
60
50
40
30
20
10
0
Concentration µg/m^3
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
DM3_PM10 Z

Graph 9:


DM1-PM2.5
100
90
80
70
60
50
40
30
20
10
0
Concentration µg/m^3
10/01/2023 00:00
10/08/2023 18:00
10/16/2023 12:00
10/24/2023 06:00
11/01/2023 00:00
DM1_PM2.5 Z

Graph 10:

DM2-PM2.5



Graph 11:

DM3-PM2.5