Northern Bus Garage
Noise, Vibration, and Dust Monitoring Report (November 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 November 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 month's report revealed that the Mic5 hardware required evaluation, and was replaced again this month on November 8th, and all values returned to normal ranges.

Numerous noise level exceedances at all hours of the day and all days of the week. Mic1 recorded the highest noise levels of any location during working hours. In addition, Mic1 and Mic2 were similar to one another with 51% of the exceedances coming outside of working hours. Mic3 and Mic4 were also similar to each other with about 46% of its exceedances outside of working hours. Mic5 recorded 64% 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

There was one vibration exceedances in the month of November 2023 due to a battery swap of the equipment. A single vibration spike occurred at the VM2 location at 0.21in/sec on 11/12 at 4:06pm.

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

No vibration exceedance was reported during the month otherwise.

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 $\mu g/m^3$
Particulates (PM10)	50 $\mu g/m^3$

DM1 began experiencing power interruptions until the battery was exchanged on November 10. 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 November 2023. DM3 recorded a PM2.5 of 82 µg/m^3 and a PM10 of 91 µg/m^3 on November 24 at 3:02 am due to higher winds.

GEO INSTRUMENTS

Monitoring Report

WMATA Bus Garage Monthly Report

November 2023

Figure 1: Vibration and Noise Monitor Location Plan

16/06/2023, 13:43:04

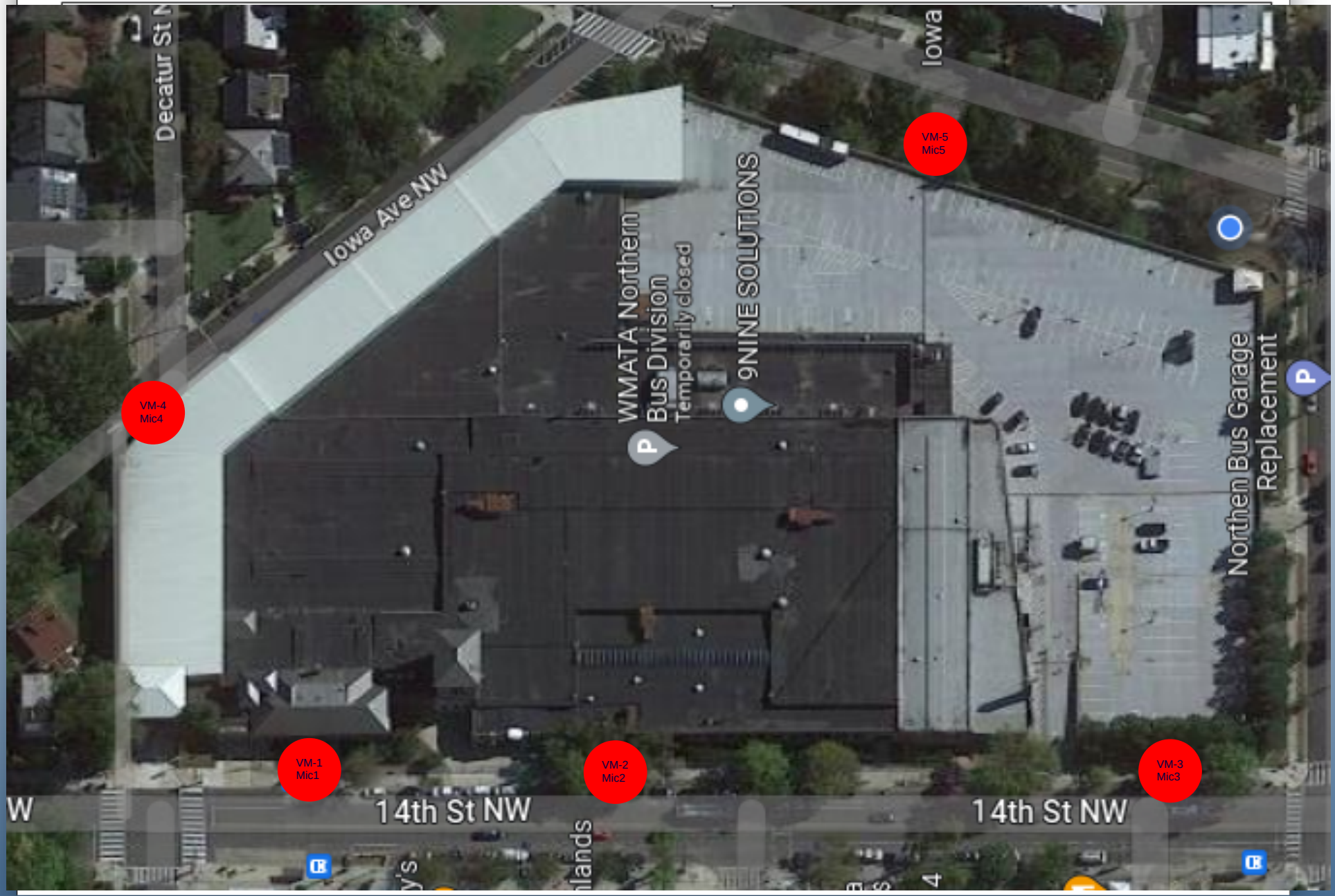


Figure 2: Dust Monitor Location Plan

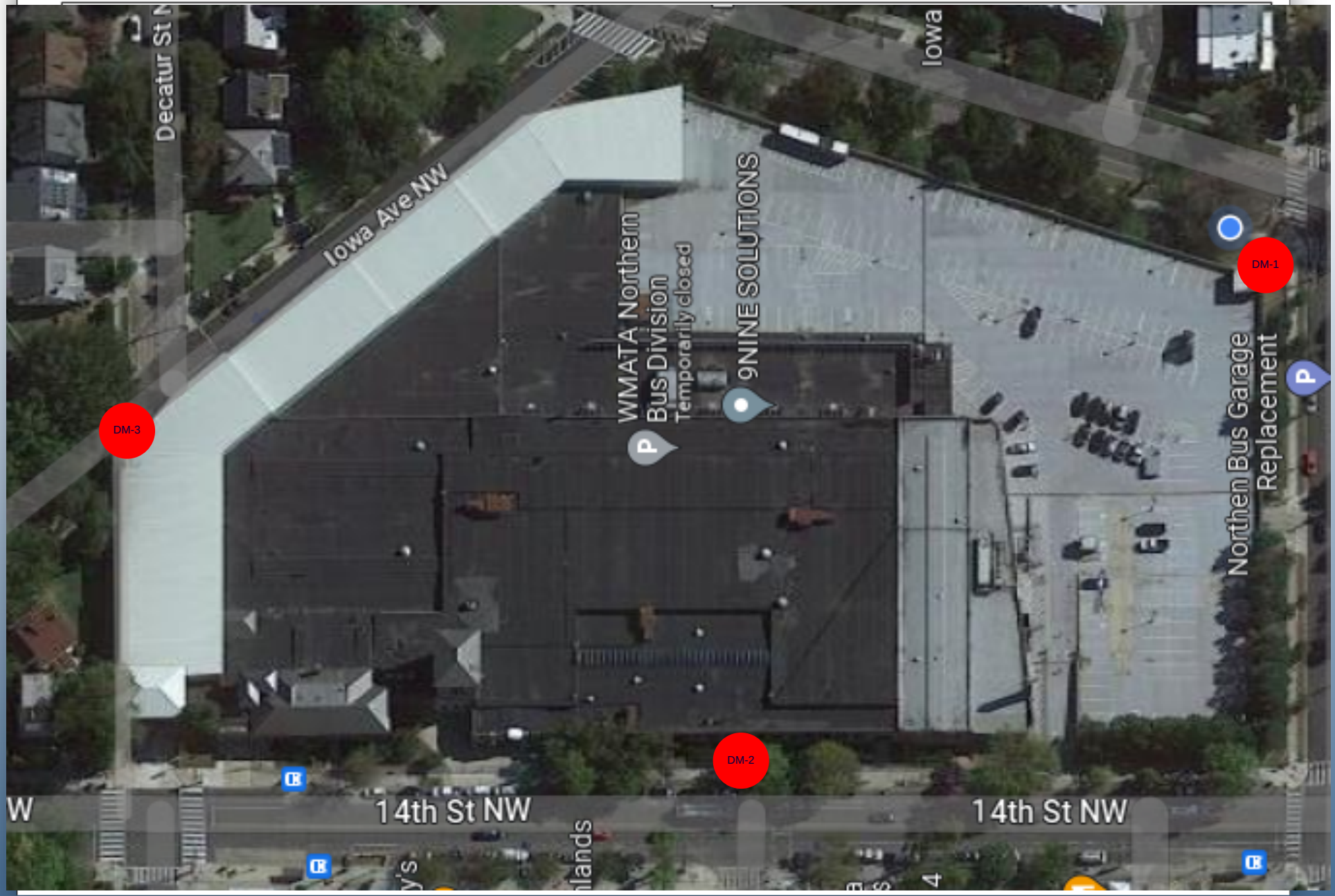


Table 1: Noise Summaries

VM-1 Mic

VM1-MIC		
	Exceedance	Percentage
Work hours	348	49.08%
After hours	135	19.04%
Weekends	226	31.88%
Total	709	100%

	Work hours	After hours	Weekends
Lmax	116	109.6	110.1
Lmin	62.3	61.5	60.9
L10	77	78	74
L90	66	64	63
Leq	83.7	78	81

VM-2 Mic

VM2-MIC		
	Exceedance	Percentage
Work hours	177	49.17%
After hours	67	18.61%
Weekends	116	32.22%
Total	360	100%

	Work hours	After hours	Weekends
Lmax	114.4	113	113
Lmin	67.7	49.9	53.1
L10	80	73	71
L90	69	69	55
Leq	78.1	79.8	79

VM-3 Mic

VM3-MIC		
	Exceedance	Percentage
Work hours	249	64.51%
After hours	50	12.95%
Weekends	87	22.54%
Total	386	100%

	Work hours	After hours	Weekends
Lmax	108	104.3	105
Lmin	67.3	61.7	68.2
L10	82	72	78
L90	72	65	69
Leq	77.8	72.1	75.3

VM-4 Mic

VM4-MIC		
	Exceedance	Percentage
Work hours	51	63.75%
After hours	7	8.75%
Weekends	22	27.50%
Total	80	100%

	Work hours	After hours	Weekends
Lmax	102.9	94.5	94.2
Lmin	65.2	43.3	49.8
L10	84	54	66
L90	69	47	52
Leq	80.8	65.9	68.7

VM-5 Mic

VM5-MIC		
	Exceedance	Percentage
Work hours	127	46.01%
After hours	52	18.84%
Weekends	97	35.14%
Total	276	100%

	Work hours	After hours	Weekends
Lmax	109.3	103.6	105.9
Lmin	92.3	91.2	90.6
L10	93	92	91
L90	93	92	91
Leq	92.5	91.5	90.8

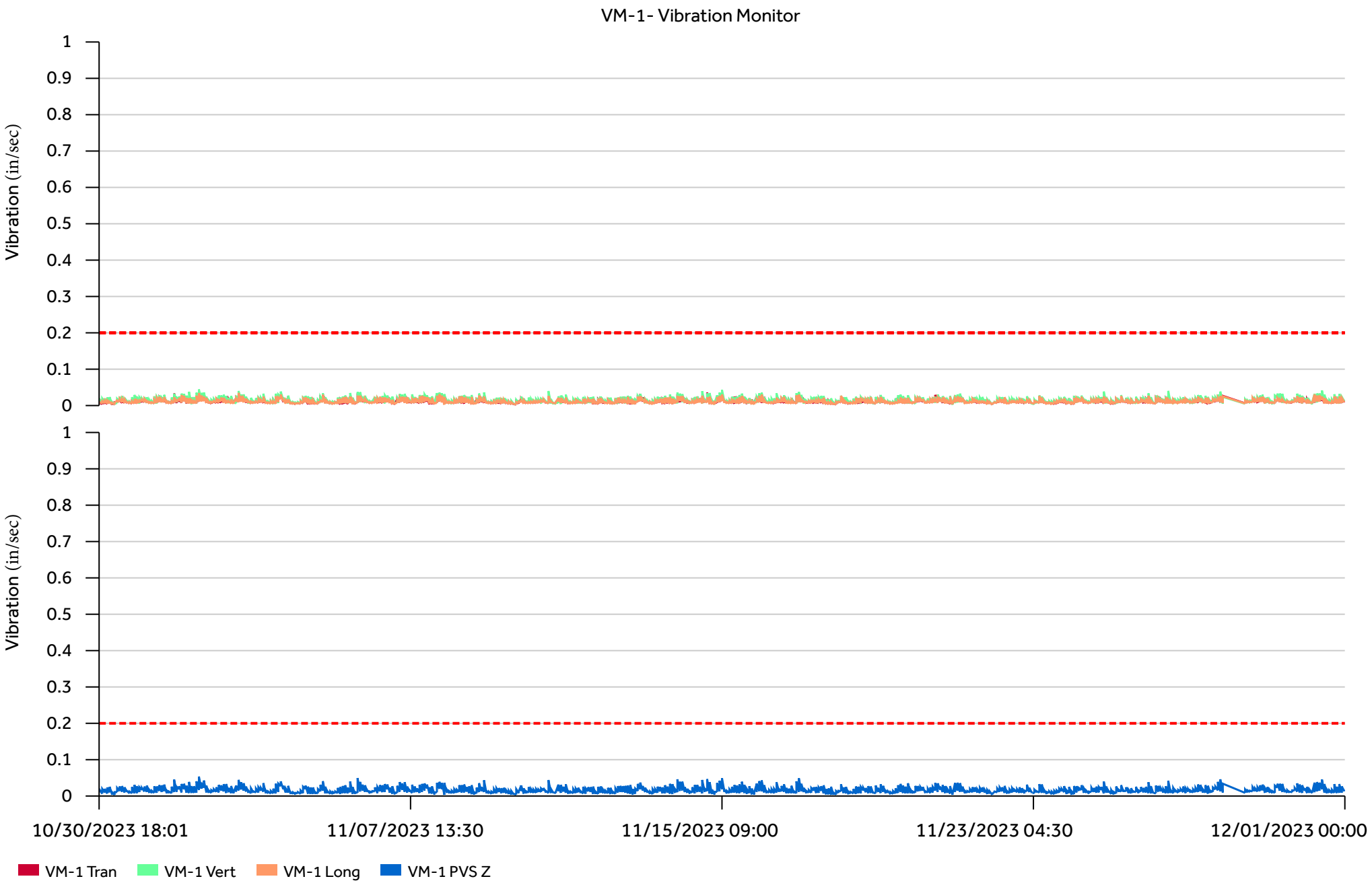
NOTES:

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

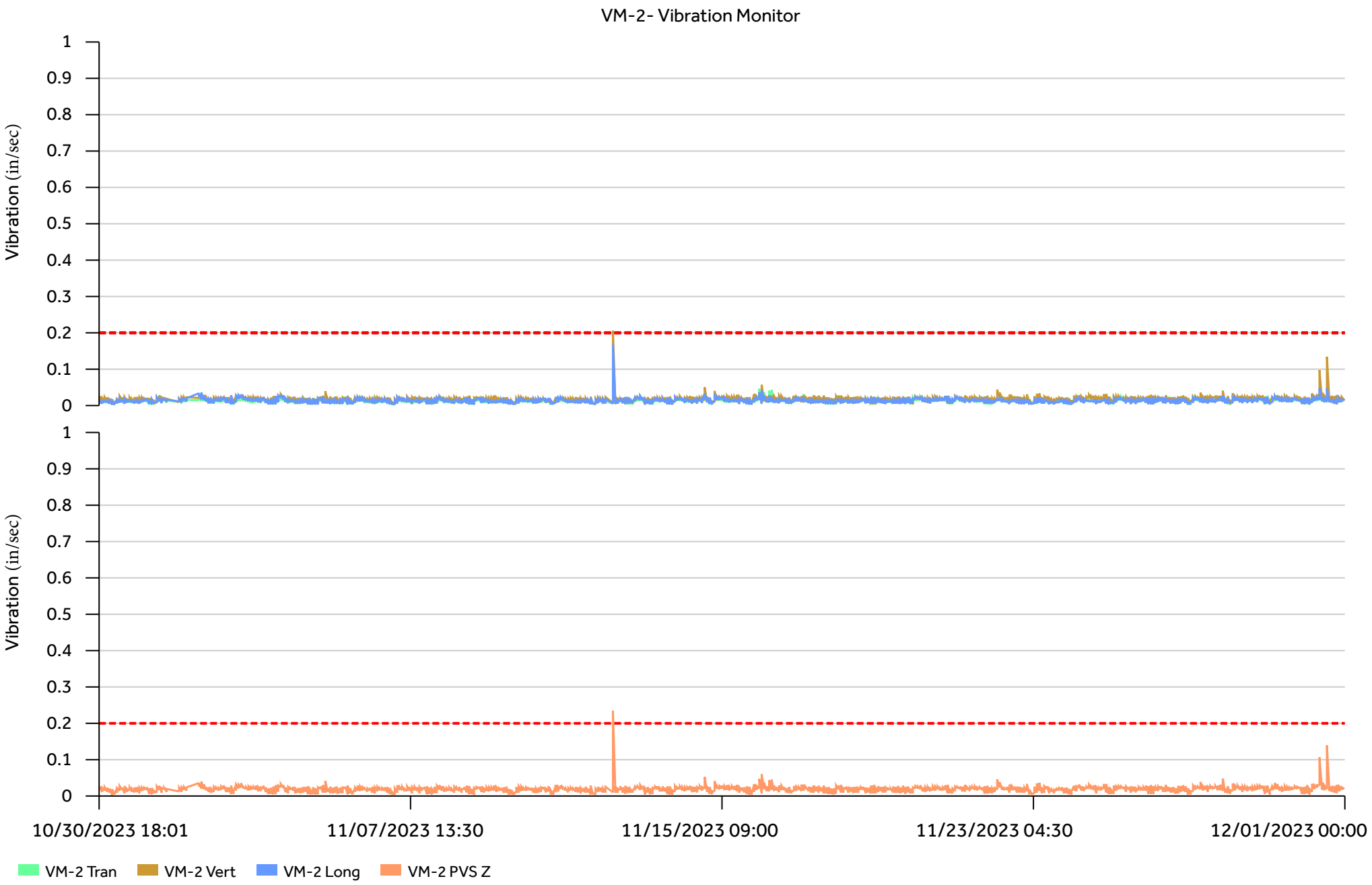
2. Measurements and Key:

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)

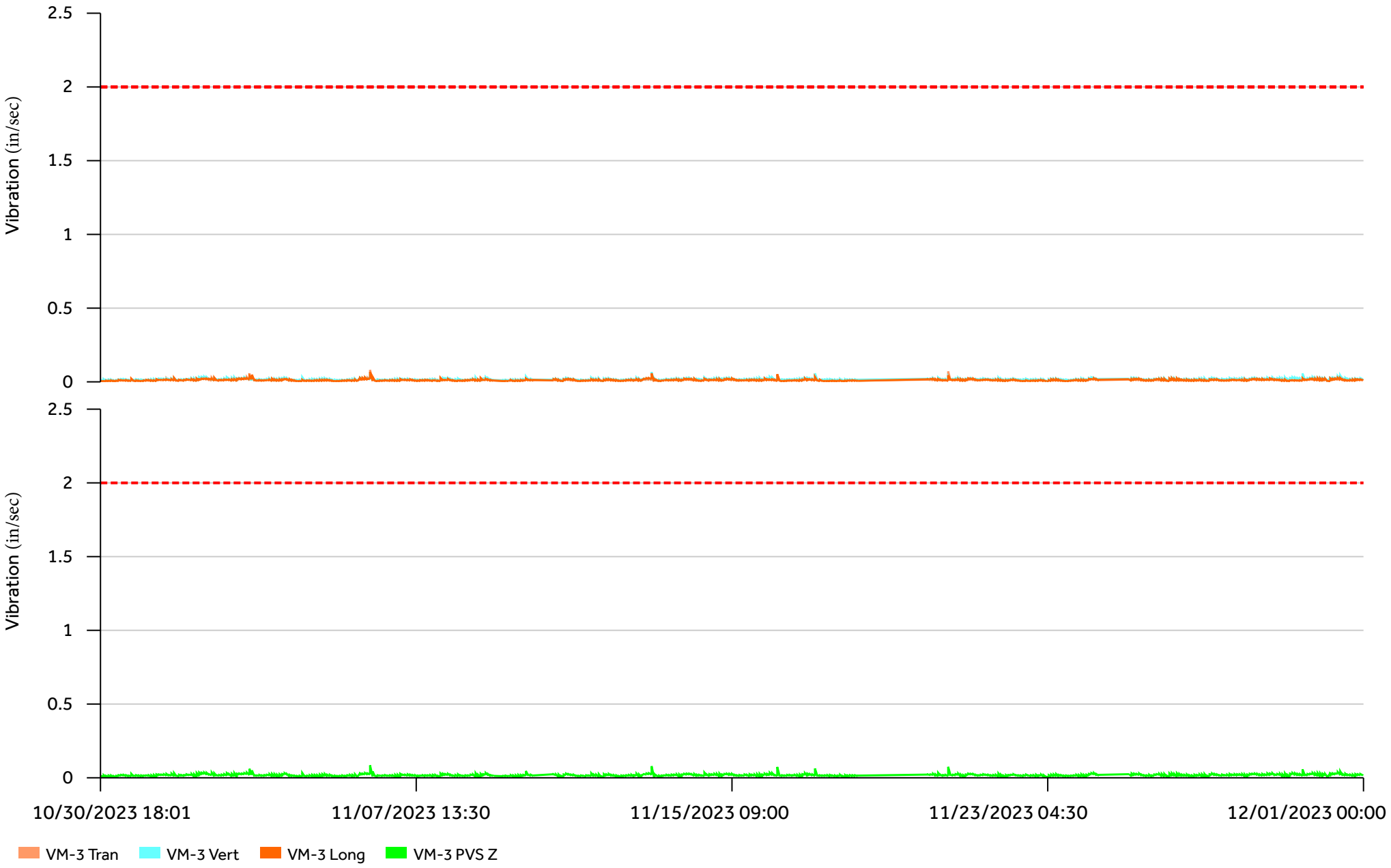
Graph 1:


VM-1- Vibration Monitor
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)
10/30/2023 18:01
11/07/2023 13:30
11/15/2023 09:00
11/23/2023 04:30
12/01/2023 00:00
VM-1 Tran
VM-1 Vert
VM-1 Long
VM-1 PVS Z

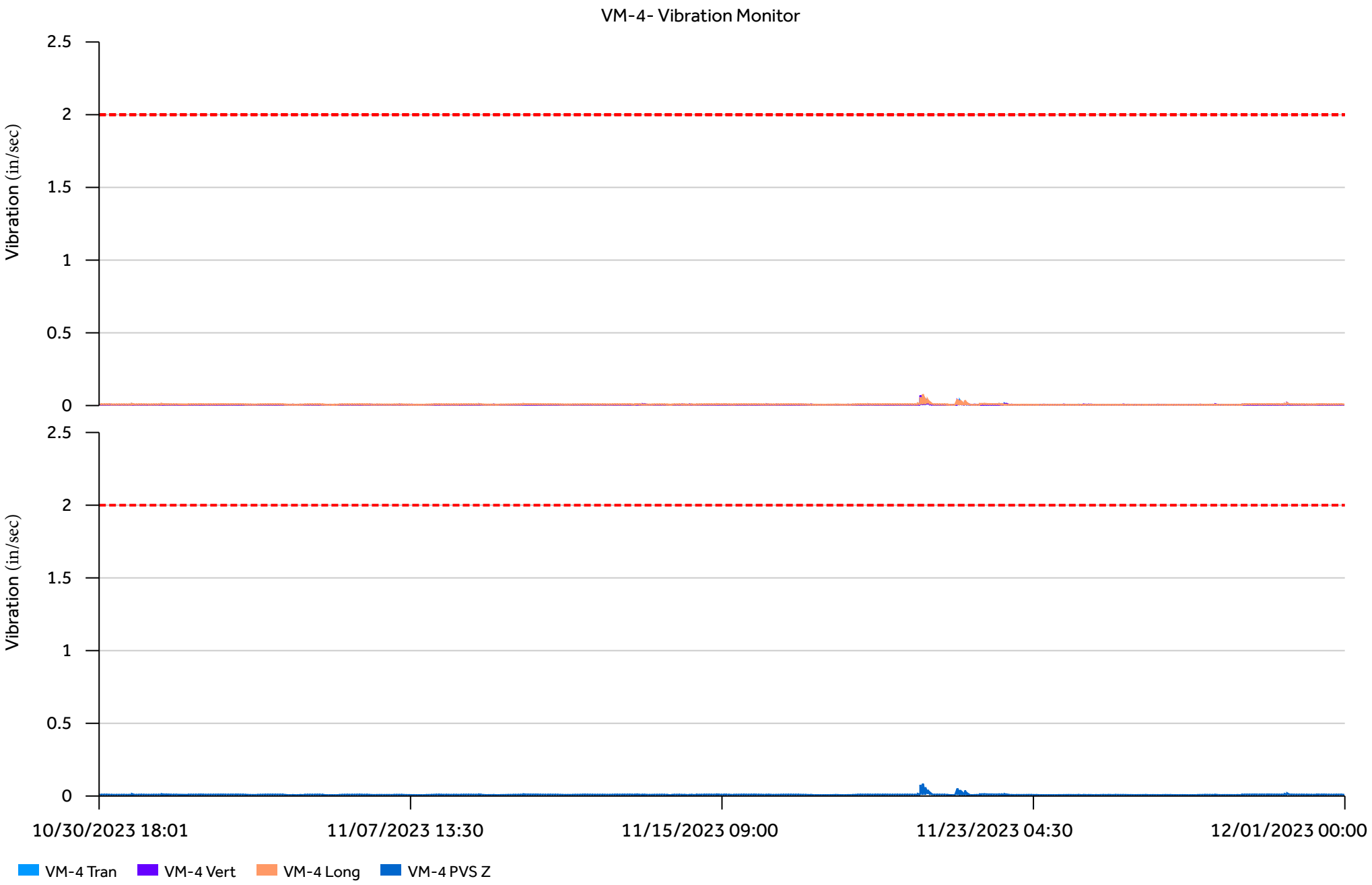
Graph 2:


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)
10/30/2023 18:01
11/07/2023 13:30
11/15/2023 09:00
11/23/2023 04:30
12/01/2023 00:00
VM-2 Tran
VM-2 Vert
VM-2 Long
VM-2 PVS Z

Graph 3:

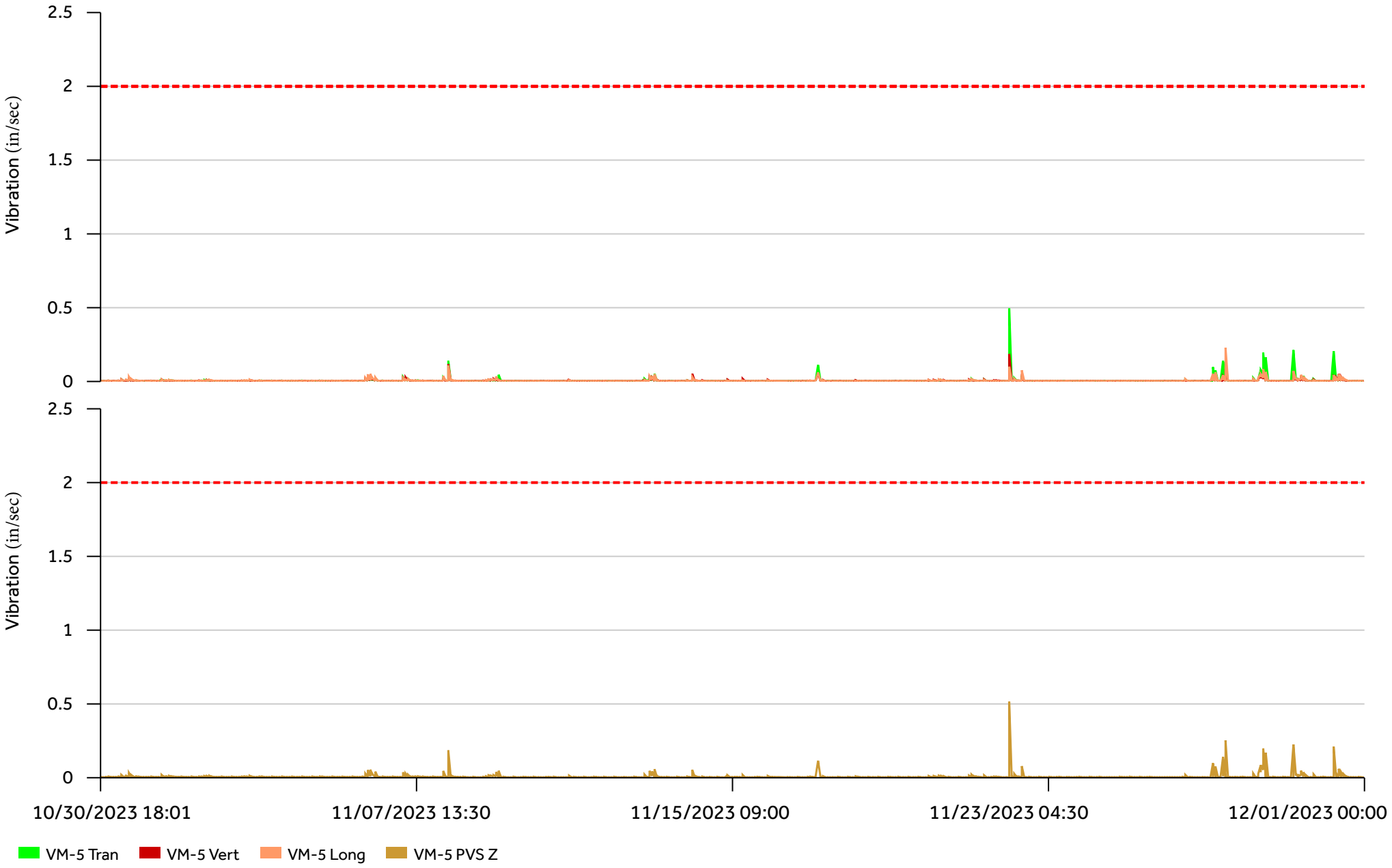

VM-3- Vibration Monitor
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
10/30/2023 18:01
11/07/2023 13:30
11/15/2023 09:00
11/23/2023 04:30
12/01/2023 00:00
VM-3 Tran
VM-3 Vert
VM-3 Long
VM-3 PVS Z

Graph 4:

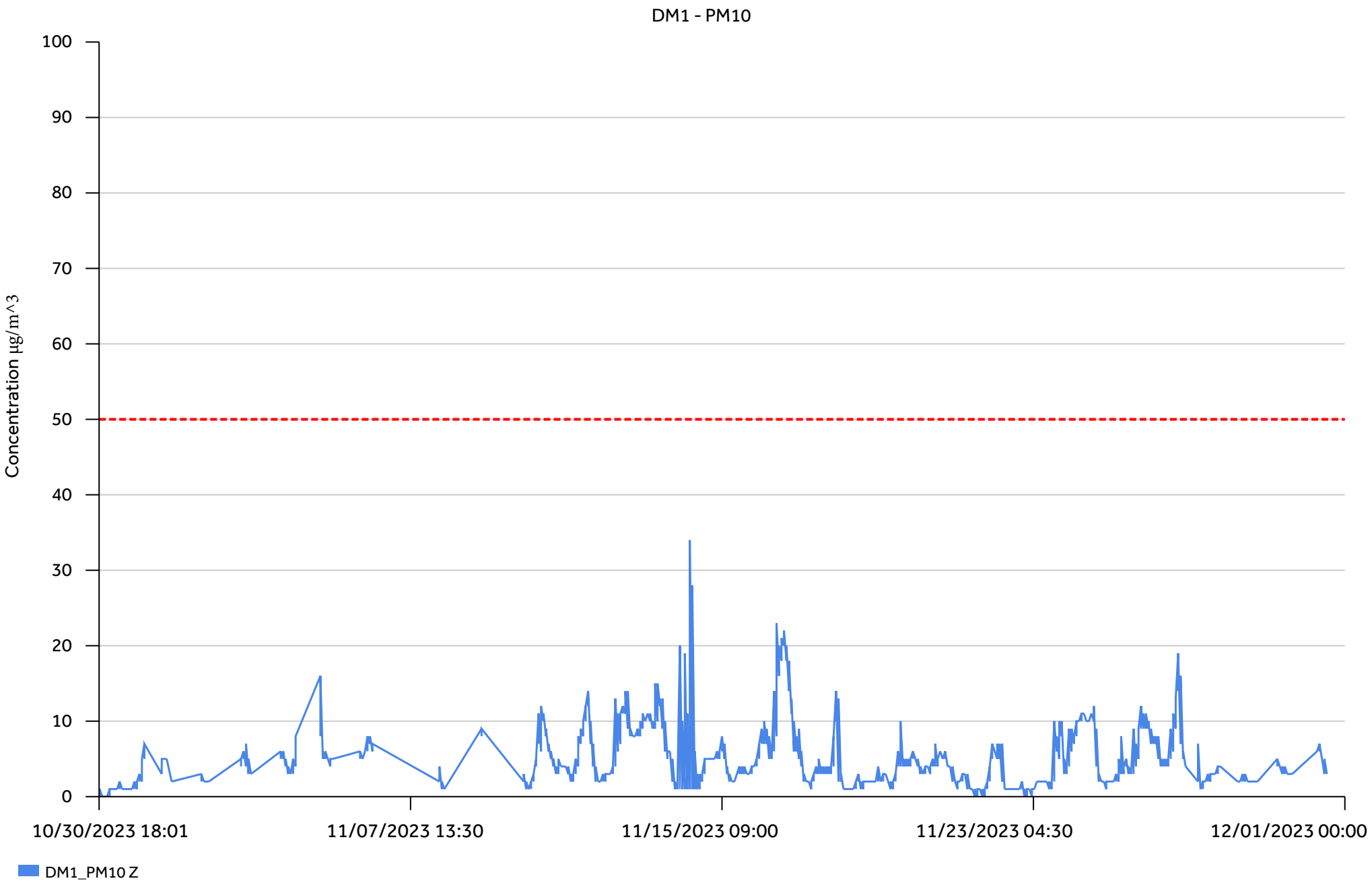

VM-4- Vibration Monitor
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
Vibration (in/sec)
2.5
2
1.5
1
0.5
0
10/30/2023 18:01
11/07/2023 13:30
11/15/2023 09:00
11/23/2023 04:30
12/01/2023 00:00
VM-4 Tran
VM-4 Vert
VM-4 Long
VM-4 PVS Z

Graph 5:

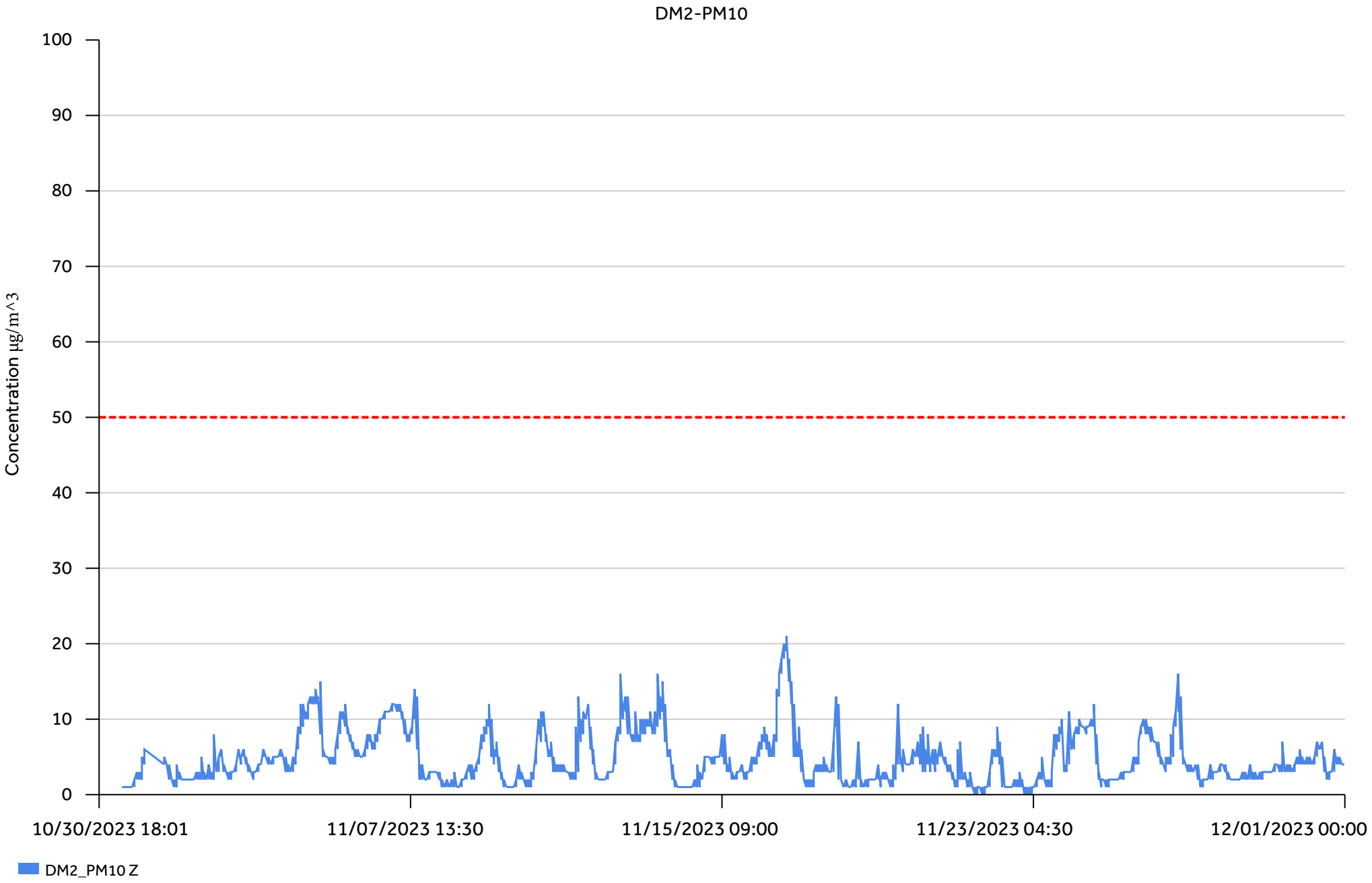
VM-5- Vibration Monitor



Graph 6:

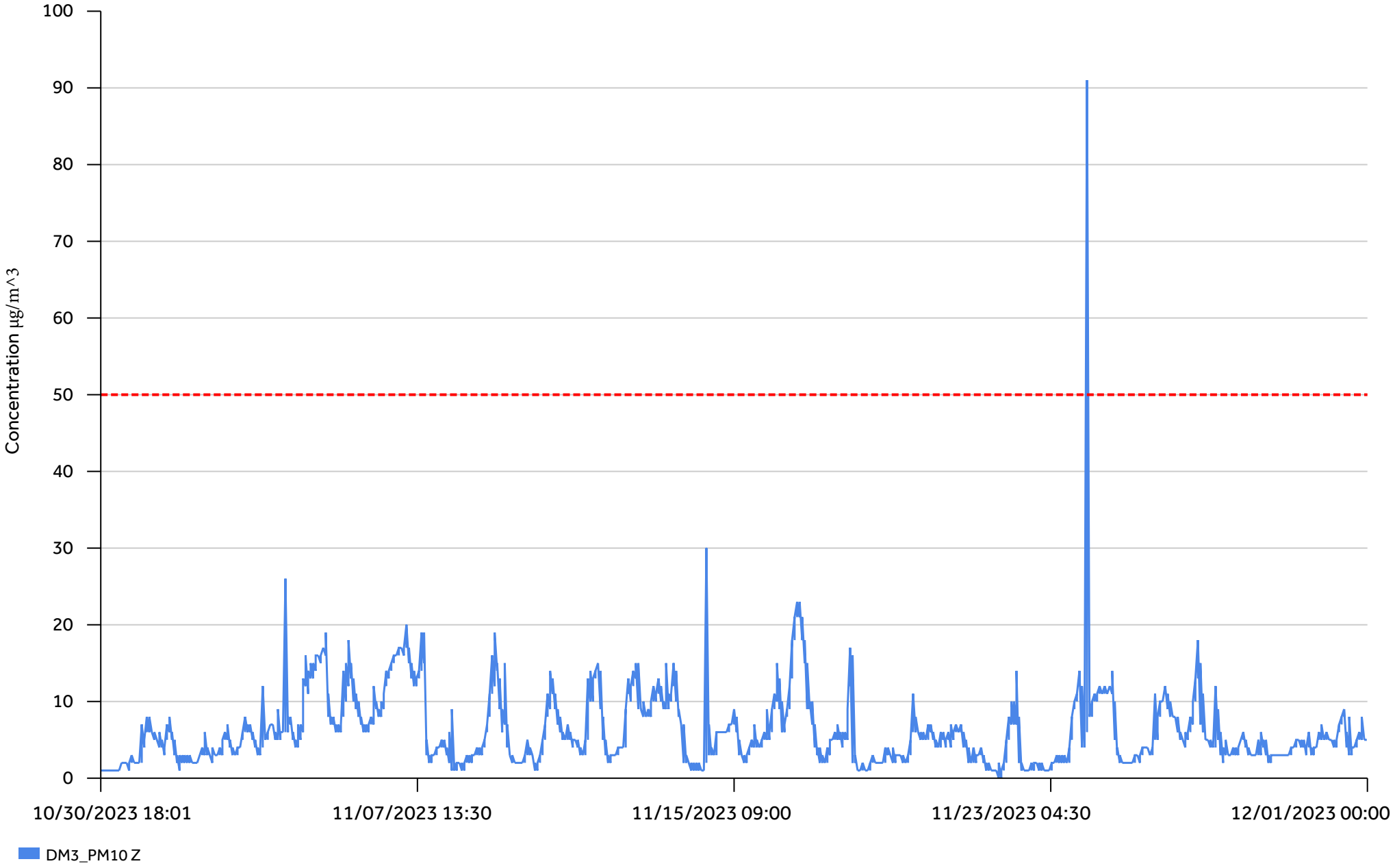

DM1 - PM10
100
90
80
70
60
50
40
30
20
10
0
Concentration µg/m^3
10/30/2023 18:01
11/07/2023 13:30
11/15/2023 09:00
11/23/2023 04:30
12/01/2023 00:00
DM1_PM10 Z

Graph 7:


DM2-PM10
100
90
80
70
60
50
40
30
20
10
0
Concentration µg/m^3
10/30/2023 18:01
11/07/2023 13:30
11/15/2023 09:00
11/23/2023 04:30
12/01/2023 00:00
DM2_PM10 Z

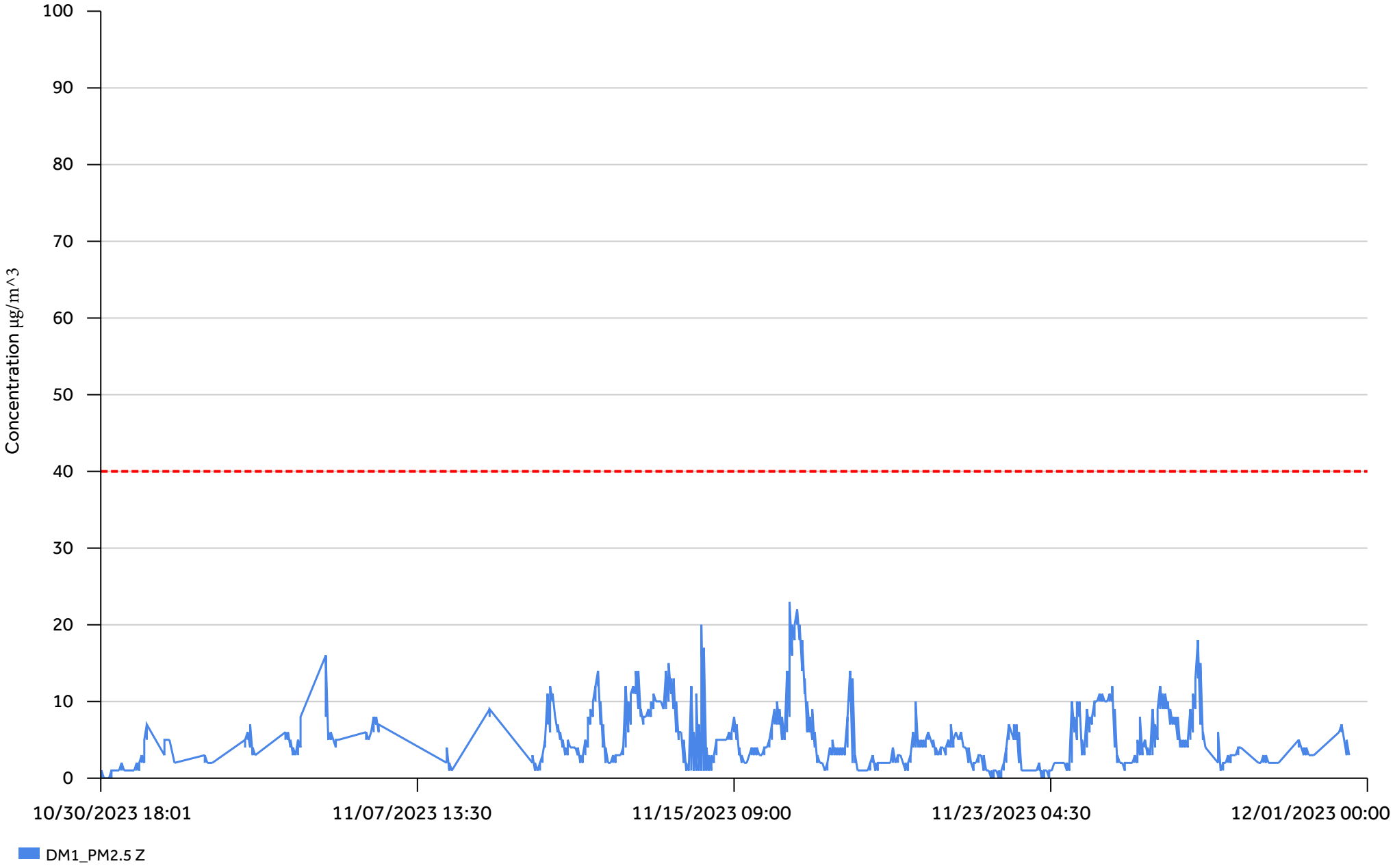
Graph 8:

DM3-PM10



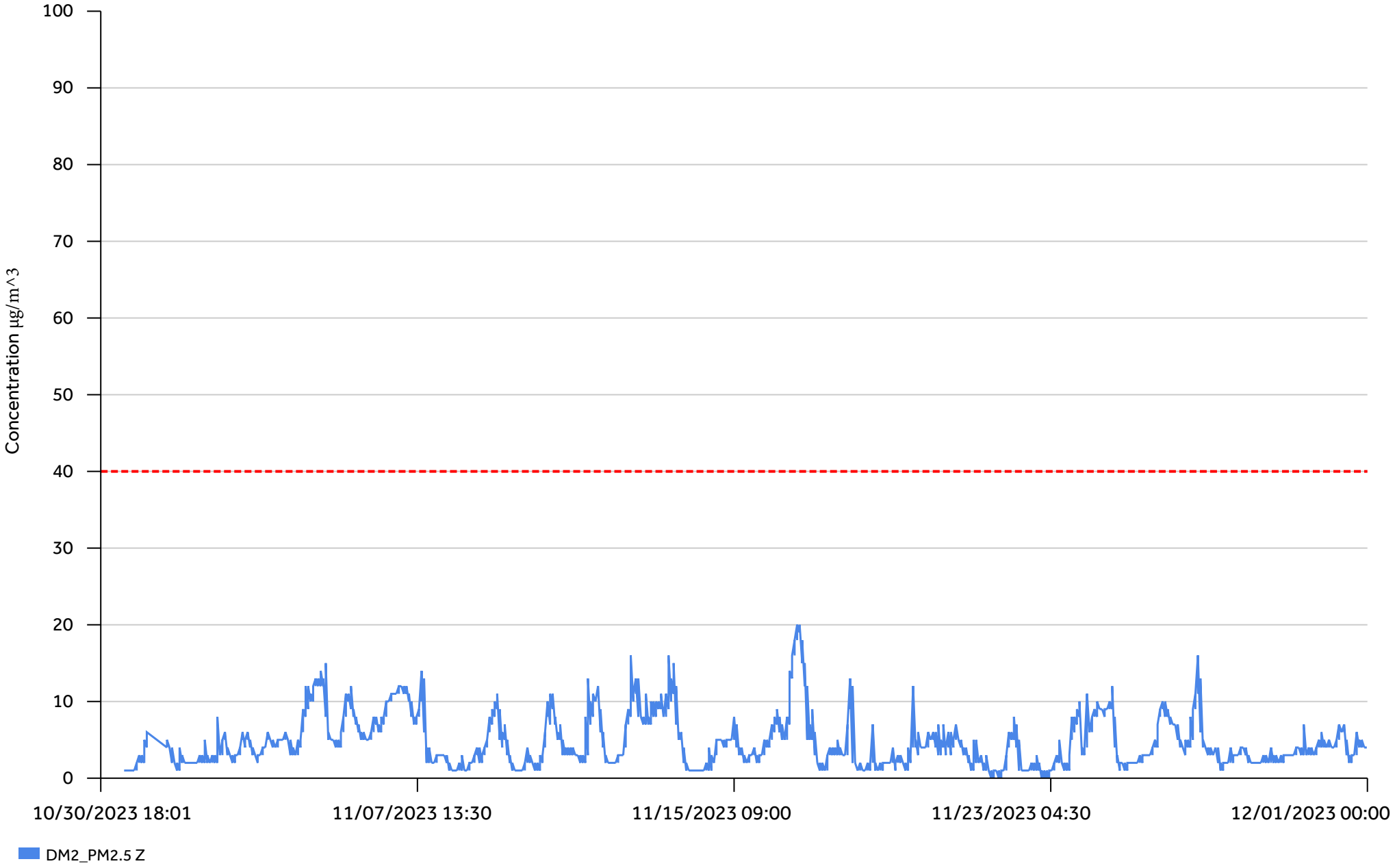
Graph 9:

DM1-PM2.5



Graph 10:

DM2-PM2.5



Graph 11:

DM3-PM2.5