

504-514 SOUTH BOULEVARD PROJECT
EVANSTON, IL

**VIBRATION
MONITORING
REPORT-8**

Mr. Antwan Ahmed
Leopardo Companies
210 N. Carpenter Street, Suite 300
Chicago, Illinois 60607

December 8, 2025

Cti



4262 Old Grand Ave
Suite 102
Gurnee, IL 60031

December 8, 2025

Mr. Antwan Ahmed
Leopardo Companies
5200 Prairie Stone Parkway
Hoffman Estates, Illinois 60192

RE: **Report 8:** - *Ground Vibration Monitoring of Construction Activities for the 504-514 S. Boulevard Project located in Evanston, Illinois.*

Mr. Ahmed,

Construction Testing and Instrumentation, Inc. (CTI) have prepared this vibration monitoring report, to evaluate vibrations during construction activities. This report summarizes the results of ground vibration monitoring of three seismographs. All units are located at the adjacent residential properties to the project site (see attached location diagram). This summary report covers the monitoring period from **December 1, 2025, through December 7, 2025**

The site is equipped with two Omnidot Swarm V2.2cw seismographs and one Geosonic 3000LC. All devices are capable of recording peak particle velocity (PPV) and frequency (in Hertz), allowing for comprehensive vibration monitoring and analysis. The maximum allowable peak particle velocity is 0.5 inches per second (IPS), which is based upon the criteria established by the U.S Bureau of Mines (USBM) and a typical construction threshold. The seismographs are set to trigger whenever vibration levels exceed 0.003 in/s lowest (PPV) and continuously monitor vibrations during all construction activities.

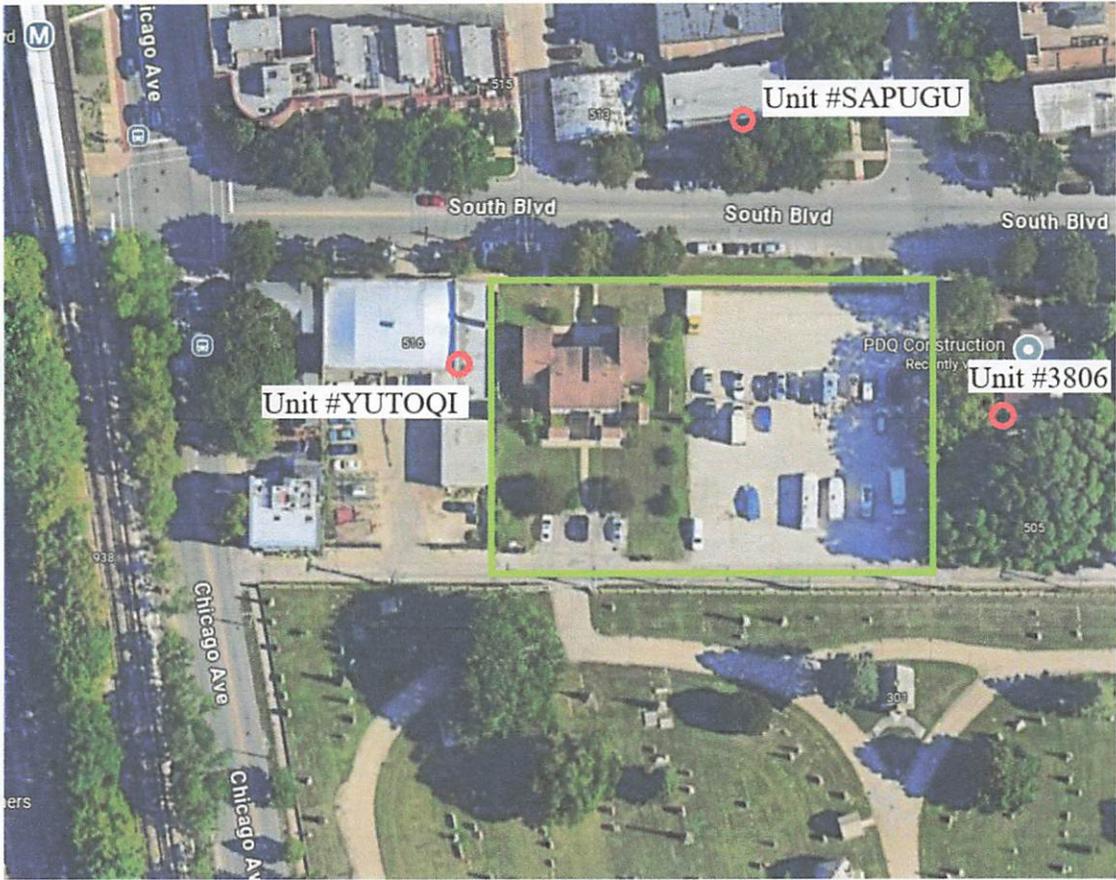
All vibration recordings during this report period were below the 0.5-inch per second threshold limit. The maximum PPV and averages for the monitoring period are below.

December 2, 2025	Location #1 – 516 South Blvd	Unit #YUTOQI	0.051 (in/sec)
December 5, 2025	Location #2 – 507 South Blvd	Unit #SAPUGU	0.040 (in/sec)
December 5, 2025	Location #3 – 424 South Blvd	Unit #3806	0.083 (in/sec)

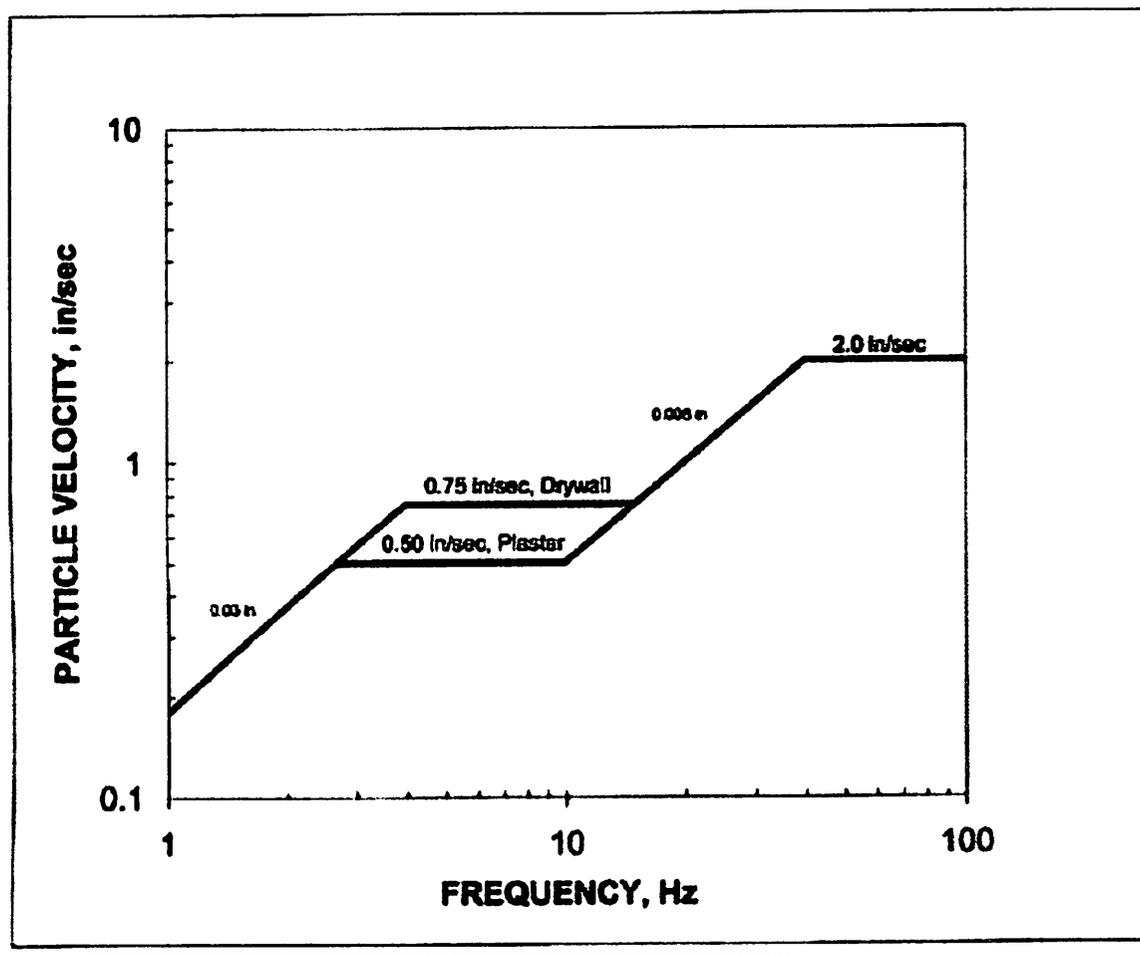
If you have any questions regarding this report, please contact this office at (847) 244-5108.

Sincerely,
Construction Testing & Instrumentation, Inc.

Daniel J. McCarthy
Senior Instrumentation Specialist



○ Seismograph Location



INDUSTRY STANDARD ACCEPTABLE PPV LEVELS

The most influential research on the effects of ground-borne vibrations was conducted by Siskind et al. (1980) of the U.S. Bureau of Mines.¹ Based on the results of an extensive experimental study, the authors recommended acceptable vibration levels for residential structures at which there is a sufficiently lower probability of damage initiation. They suggested a minimum peak particle velocity at frequencies below 40 Hz of 0.75 in/sec for homes with gypsum wallboard construction and 0.5 in/sec for homes with plaster and lath construction. An acceptable peak particle velocity of 2.0 in/sec was recommended for all homes at frequencies greater than 40 Hz. These values were based on a 5% probability of occurrence of threshold (cosmetic) damage. The authors also developed a more detailed functional relationship between acceptable PPV levels and vibration frequency. A similar functional relationship was adopted by the Office of Surface Mining Reclamation and Enforcement.² The USBM and OSMRE curves are shown in Figure 2. These recommended acceptable PPV levels have been successfully applied to other activities that induce ground-borne vibrations and they have been widely used by the construction industry.

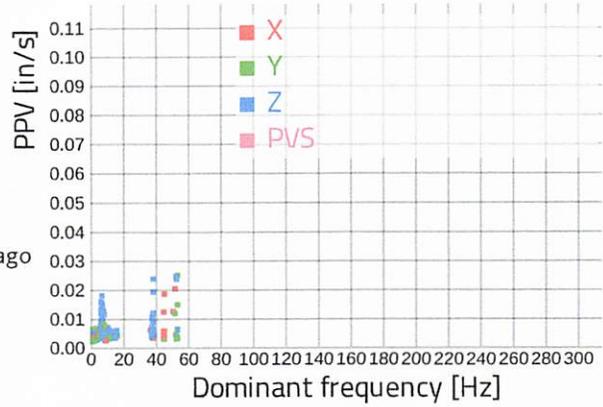
¹ Siskind, D. E., Stagg, M. S., Kopp, J. W., and Dowding, C. H. (1980). "Structure Response and Damage Produced by Ground Vibration from Surface Blasting," *Report of Investigations 8507*, U.S. Bureau of Mines. ² Rosenthal, M. F. and Morlock, G. L. (1987). *Blasting Guidance Manual*, U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement.

Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



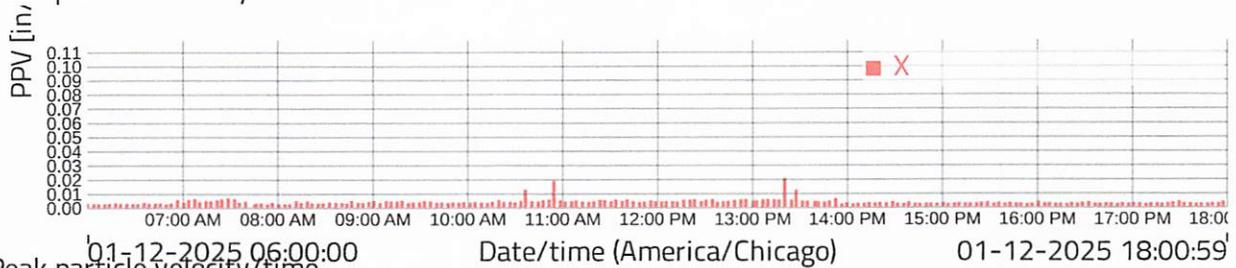
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 Guideline ISEE 250Hz
 Measuring interval 6 seconds
 Storage below threshold interval 60 seconds
 Store values below threshold On
 Timezone America/Chicago
 Calculate VDV (Vibration Dose Value) Off
 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

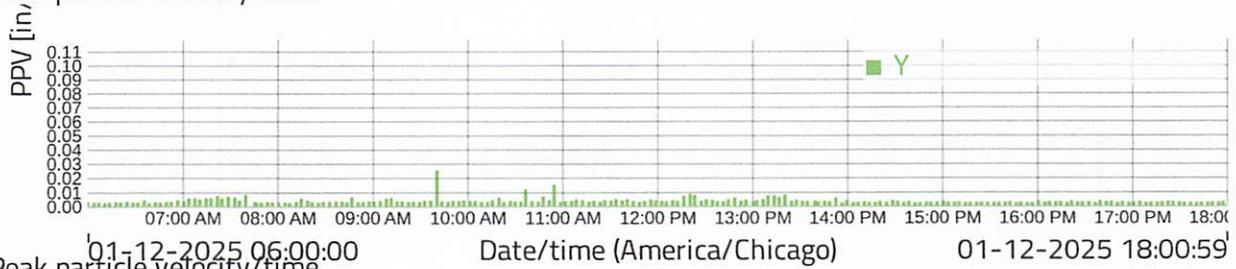


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 1, 2025 13:21:23	x	0.020	52.0
Dec. 1, 2025 09:41:23	y	0.025	53.5
Dec. 1, 2025 13:21:23	z	0.024	52.5

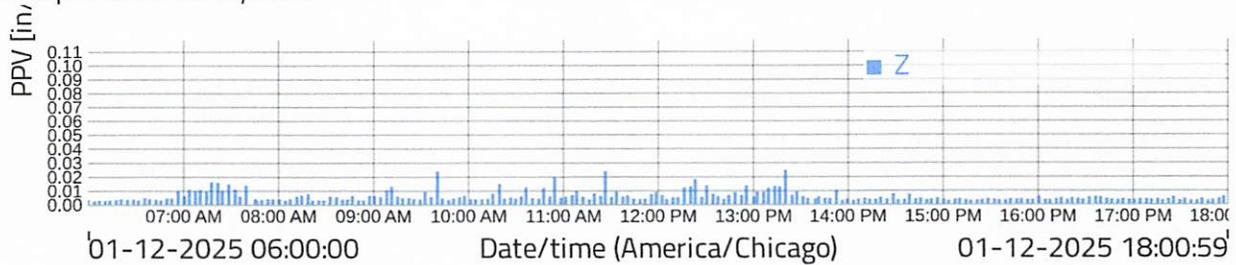
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

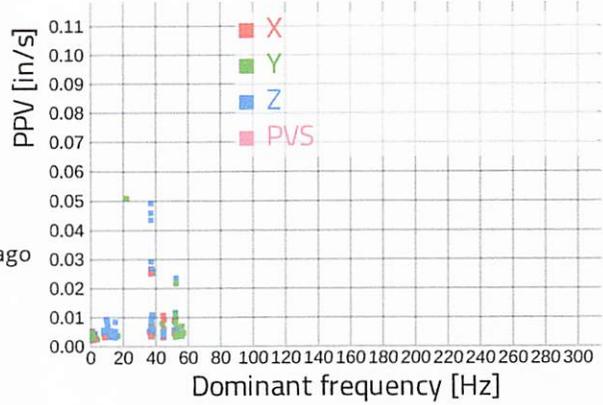


Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



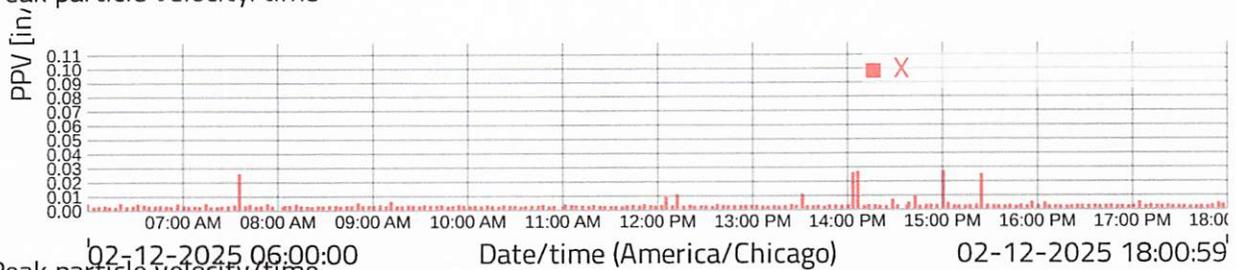
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 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

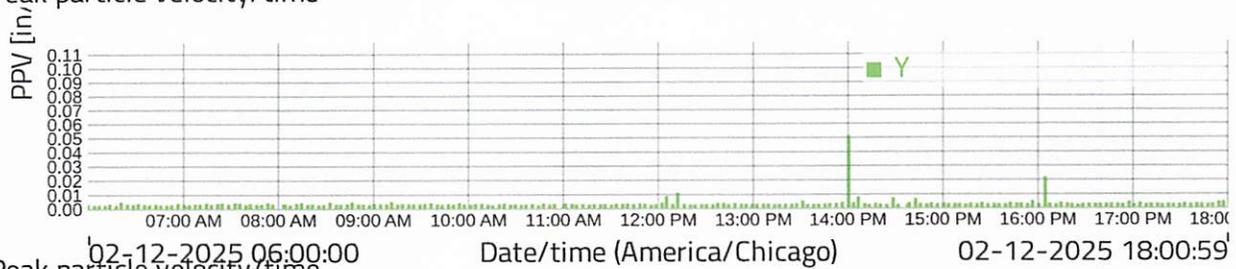


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 2, 2025 15:03:11	x	0.027	38.0
Dec. 2, 2025 14:02:41	y	0.051	22.5
Dec. 2, 2025 14:02:41	z	0.049	37.5

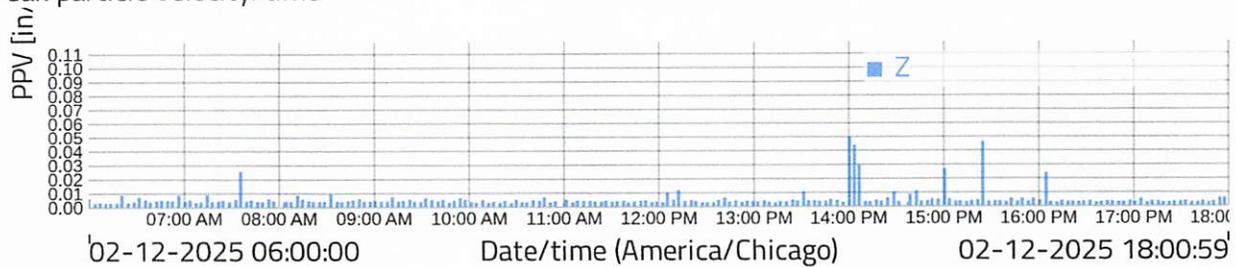
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

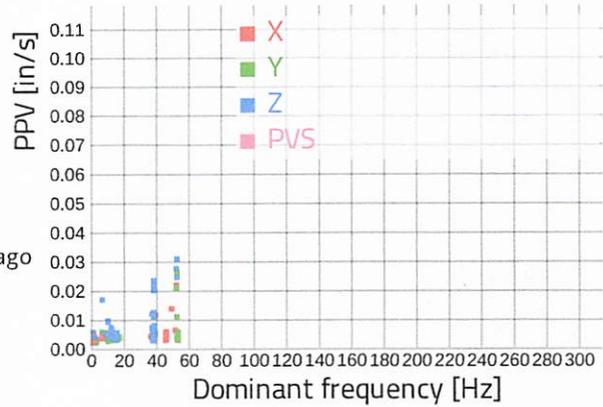


Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



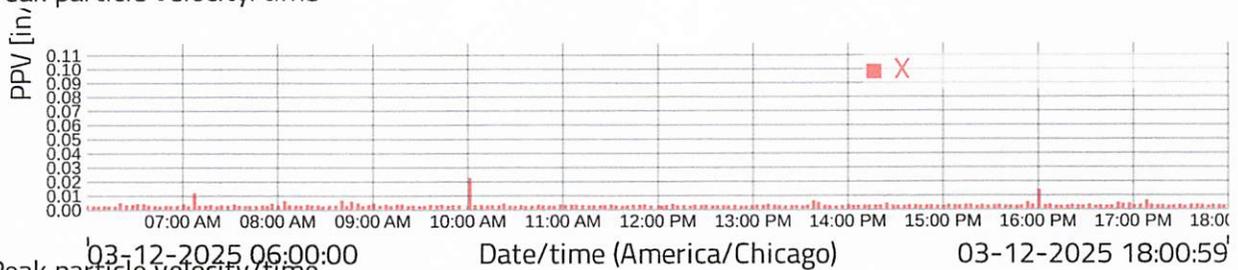
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PPV flat line threshold	0.5 in/s
Guideline	ISEE 250Hz
Measuring interval	6 seconds
Storage below threshold interval	60 seconds
Store values below threshold	On
Timezone	America/Chicago
Calculate VDV (Vibration Dose Value)	Off
Calculate PVS (Peak Vector Sum)	Off
Calculate PPV (Peak particle velocity)	On

Peak particle velocity/frequency

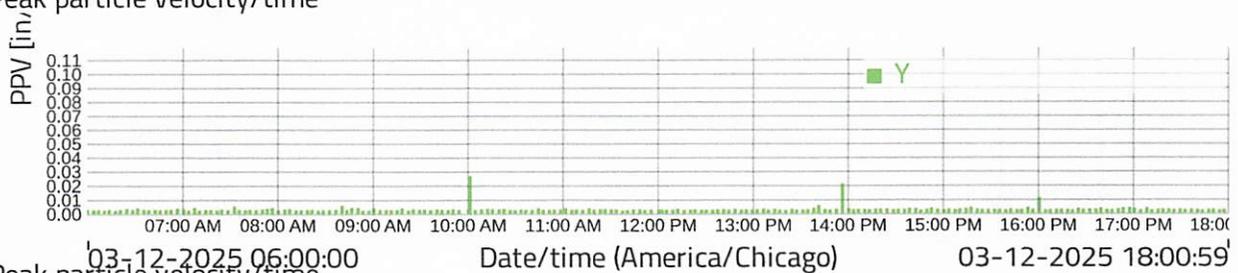


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 3, 2025 10:01:41	x	0.022	52.5
Dec. 3, 2025 10:01:41	y	0.026	53.0
Dec. 3, 2025 10:01:41	z	0.031	53.0

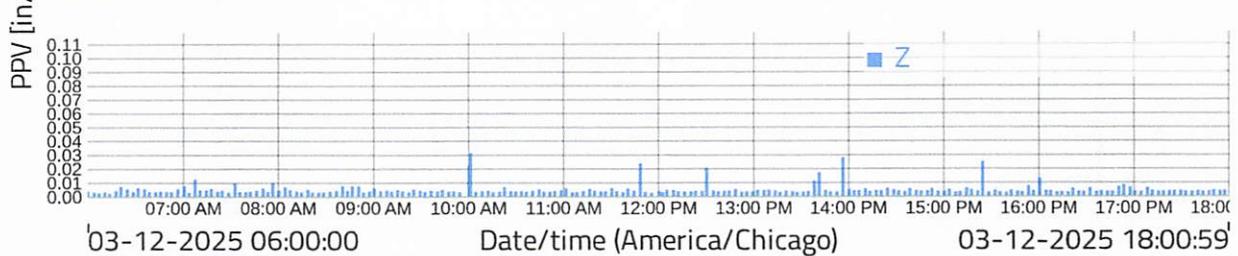
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

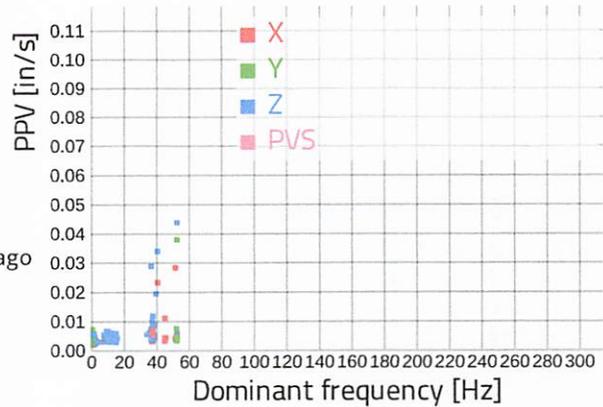


Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



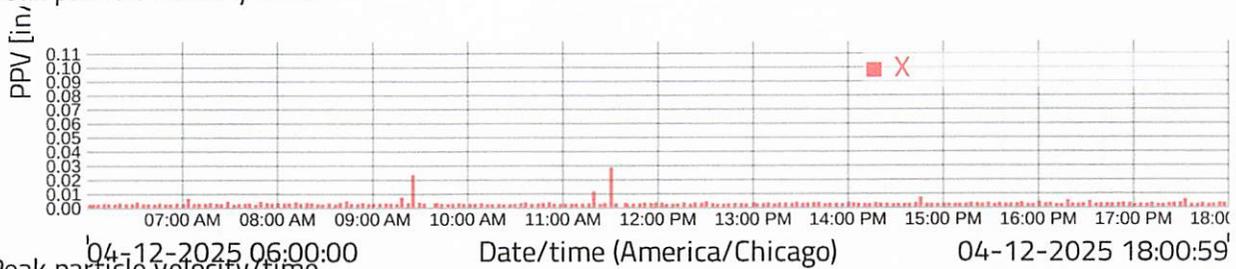
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Peak particle velocity/frequency

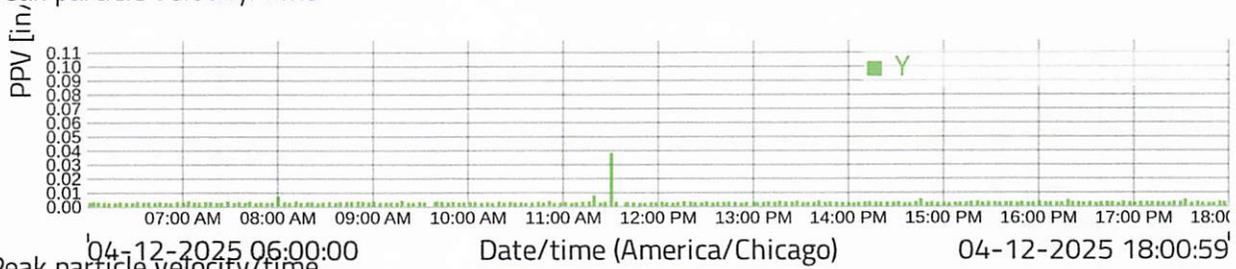


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 4, 2025 11:32:53	x	0.028	52.0
Dec. 4, 2025 11:32:53	y	0.038	53.0
Dec. 4, 2025 11:32:53	z	0.044	53.0

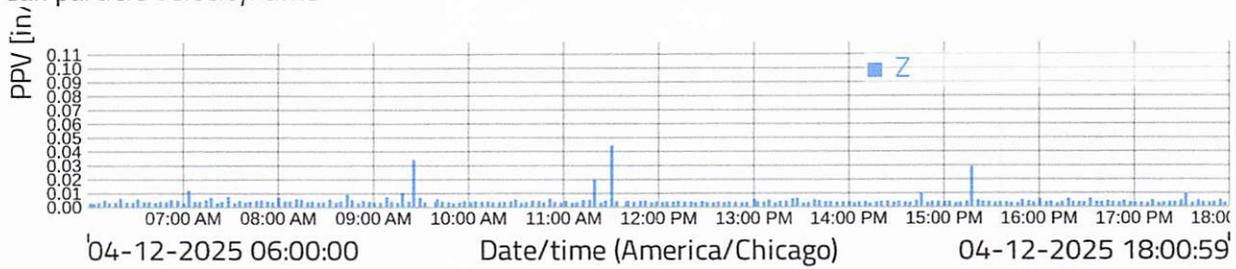
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

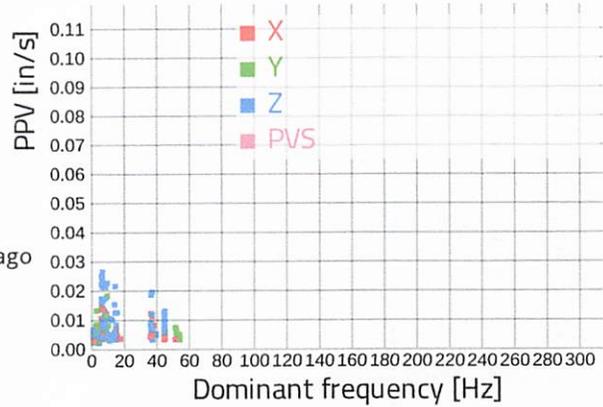


Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



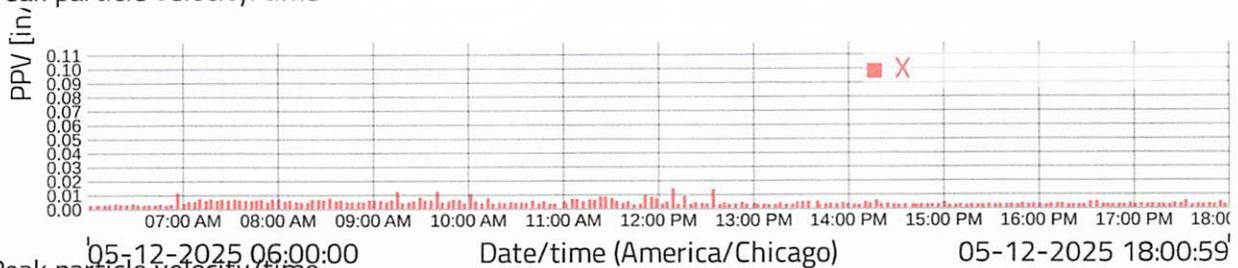
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 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

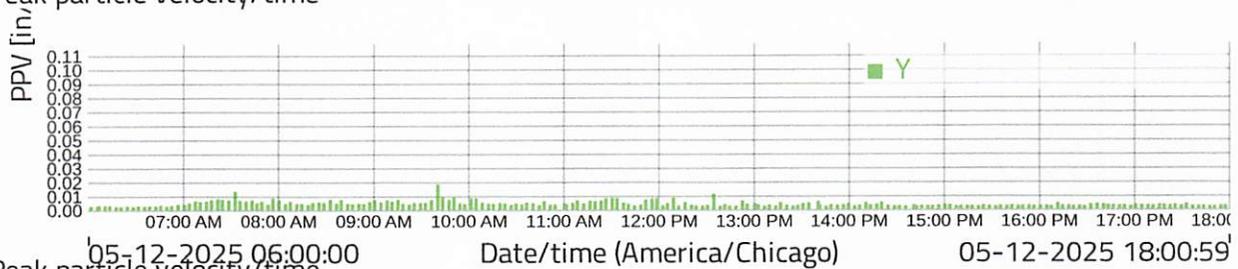


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 5, 2025 12:09:59	x	0.014	7.0
Dec. 5, 2025 09:41:59	y	0.018	10.0
Dec. 5, 2025 07:50:11	z	0.026	7.0

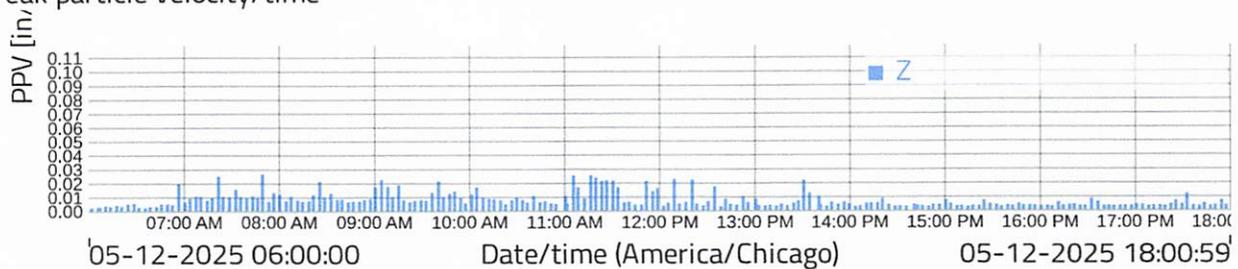
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

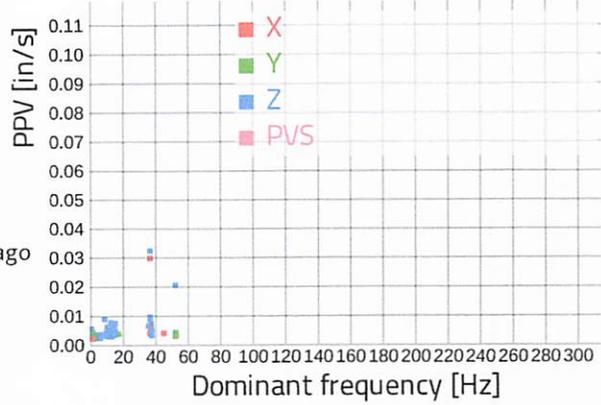


Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



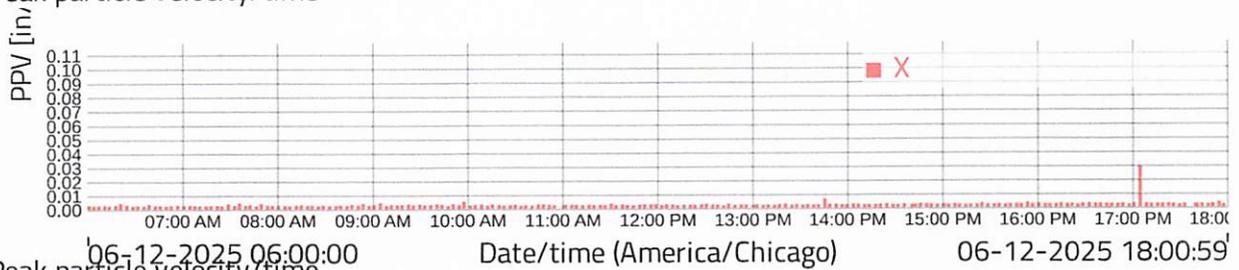
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 Guideline ISEE 250Hz
 Measuring interval 6 seconds
 Storage below threshold interval 60 seconds
 Store values below threshold On
 Timezone America/Chicago
 Calculate VDV (Vibration Dose Value) Off
 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

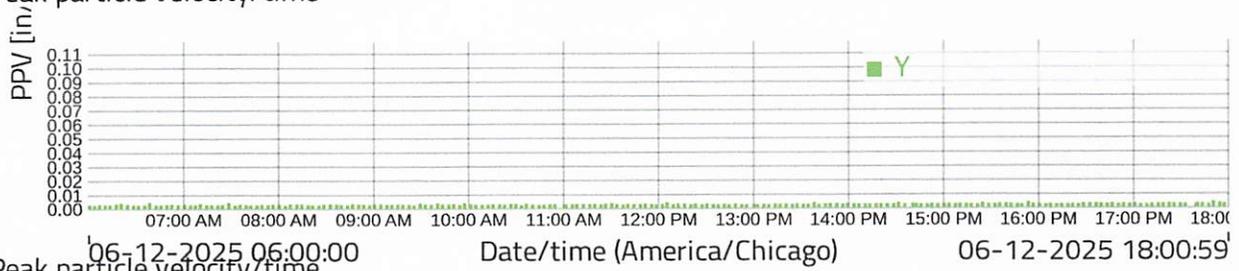


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 6, 2025 17:07:11	x	0.030	37.0
Dec. 6, 2025 06:40:59	y	0.004	52.5
Dec. 6, 2025 17:07:11	z	0.032	37.0

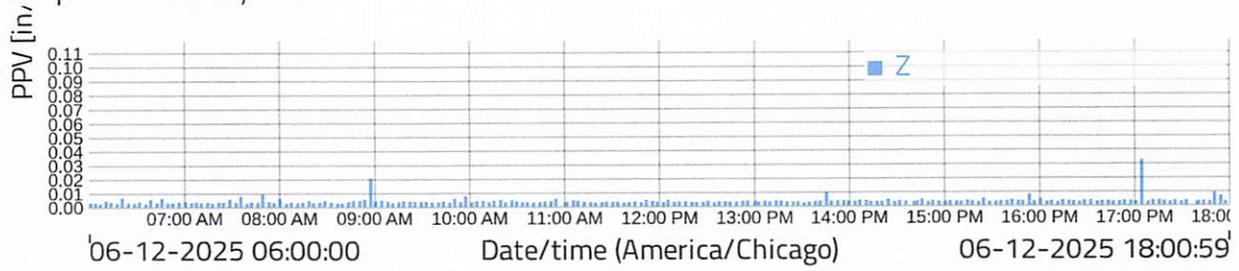
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

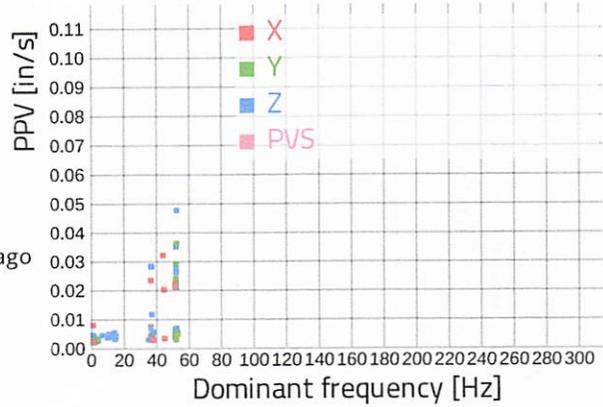


Project: LEOPARDO
 Measuring point: 516 S BLVD
 (YUTOQI)



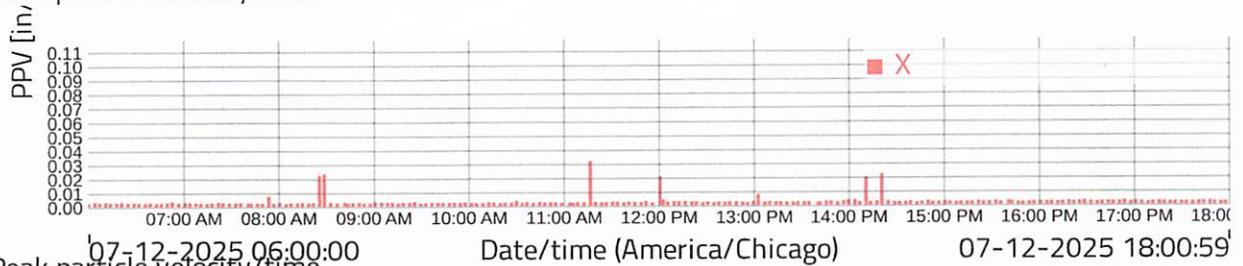
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Evaluation type	Unspecified
Threshold for measurement storage	0.02 in/s
PPV flat line threshold	0.5 in/s
Guideline	ISEE 250Hz
Measuring interval	6 seconds
Storage below threshold interval	60 seconds
Store values below threshold	On
Timezone	America/Chicago
Calculate VDV (Vibration Dose Value)	Off
Calculate PVS (Peak Vector Sum)	Off
Calculate PPV (Peak particle velocity)	On

Peak particle velocity/frequency

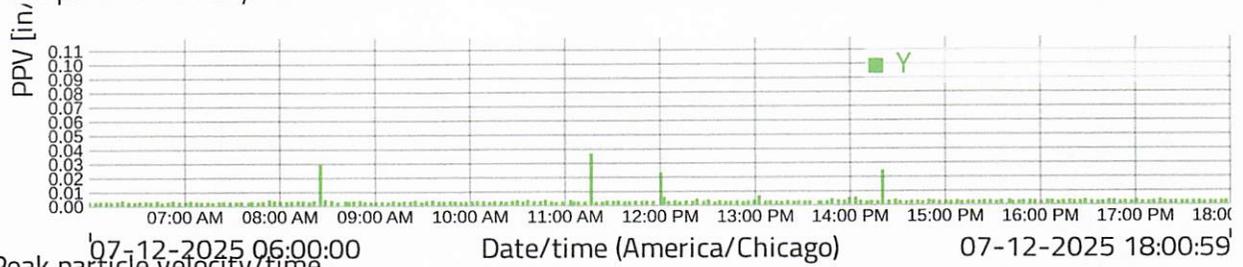


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 7, 2025 11:18:17	x	0.032	44.5
Dec. 7, 2025 11:18:17	y	0.036	53.0
Dec. 7, 2025 11:18:17	z	0.048	53.0

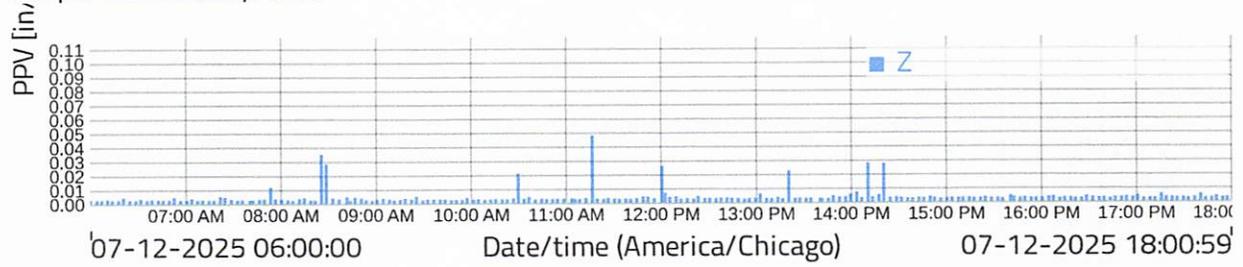
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

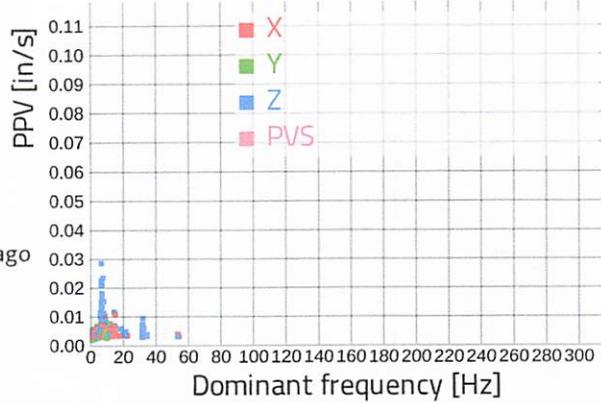


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



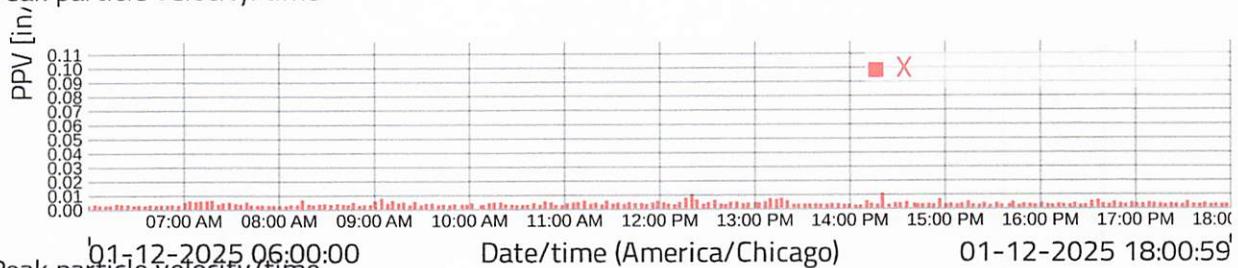
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 Guideline ISEE 250Hz
 Measuring interval 6 seconds
 Storage below threshold interval 60 seconds
 Store values below threshold On
 Timezone America/Chicago
 Calculate VDV (Vibration Dose Value) Off
 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

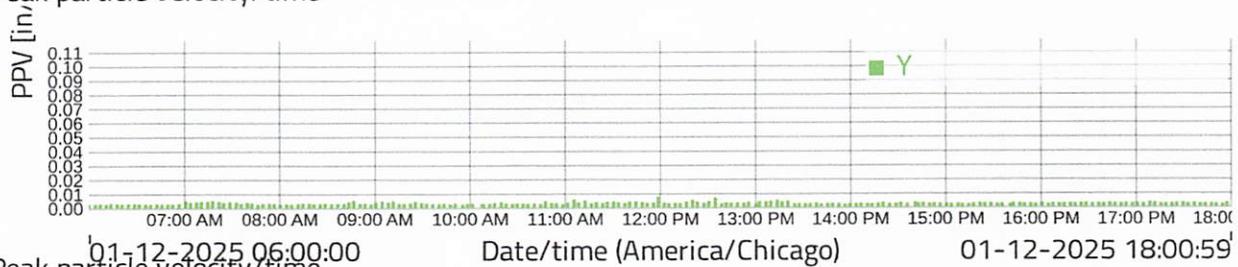


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 1, 2025 14:20:59	x	0.011	15.5
Dec. 1, 2025 12:01:59	y	0.007	11.0
Dec. 1, 2025 07:20:17	z	0.028	7.0

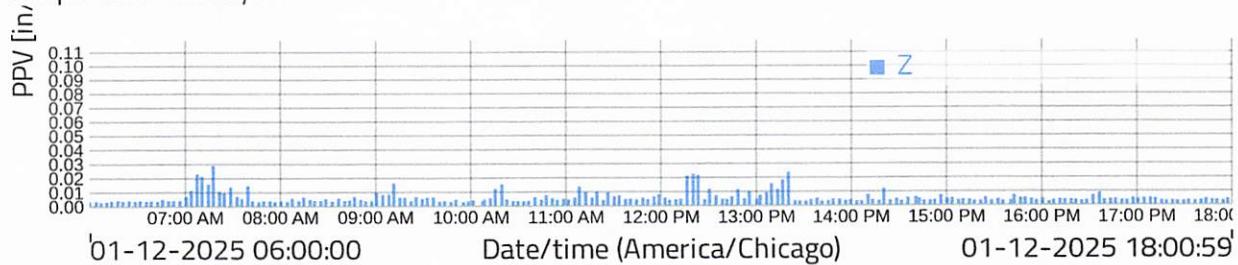
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

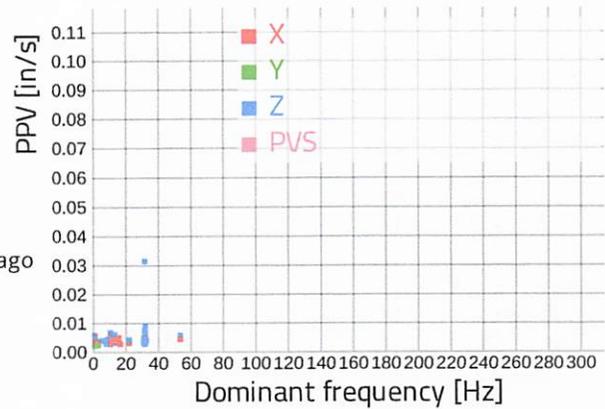


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



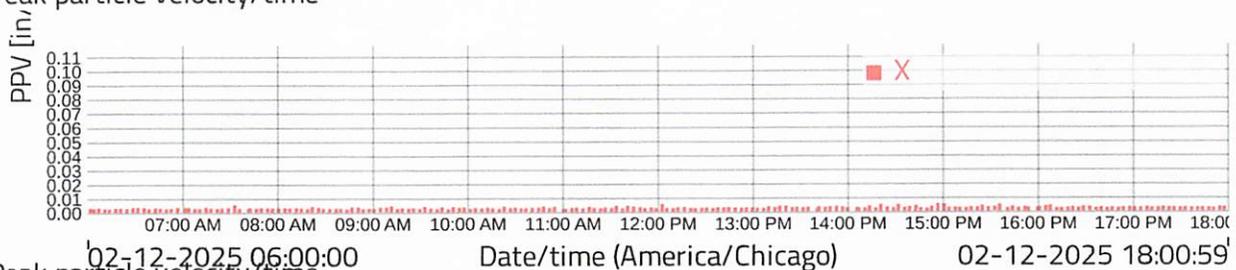
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Guideline	ISEE 250Hz
Measuring interval	6 seconds
Storage below threshold interval	60 seconds
Store values below threshold	On
Timezone	America/Chicago
Calculate VDV (Vibration Dose Value)	Off
Calculate PVS (Peak Vector Sum)	Off
Calculate PPV (Peak particle velocity)	On

Peak particle velocity/frequency

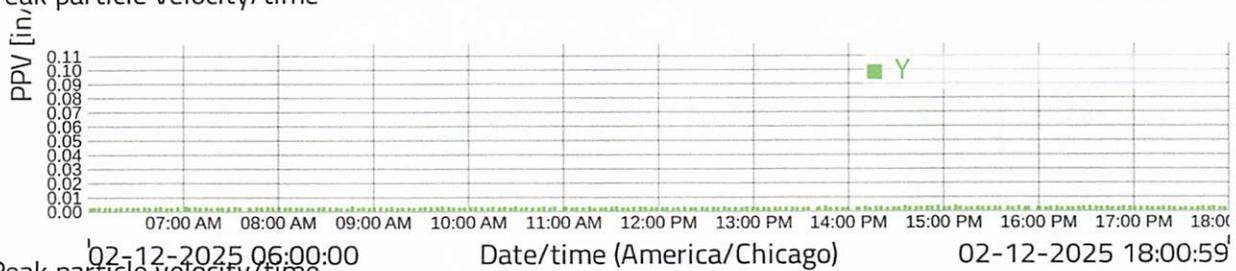


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 2, 2025 14:58:59	x	0.005	32.5
Dec. 2, 2025 15:08:59	y	0.004	1.5
Dec. 2, 2025 15:36:53	z	0.031	32.0

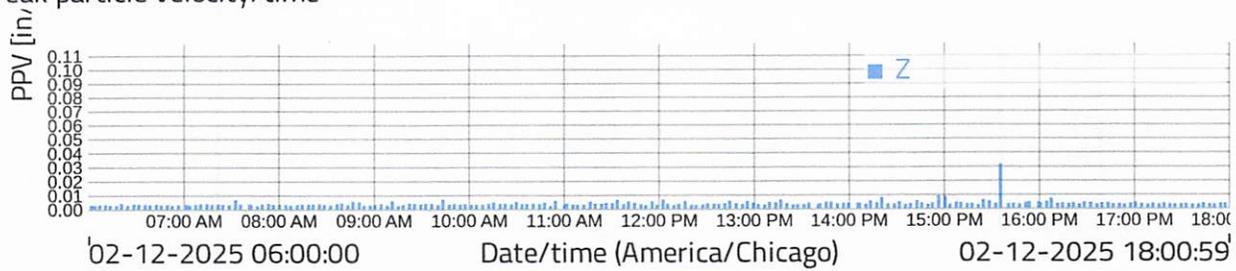
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

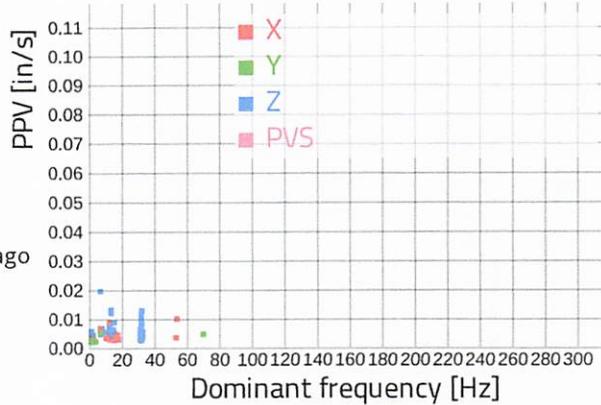


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



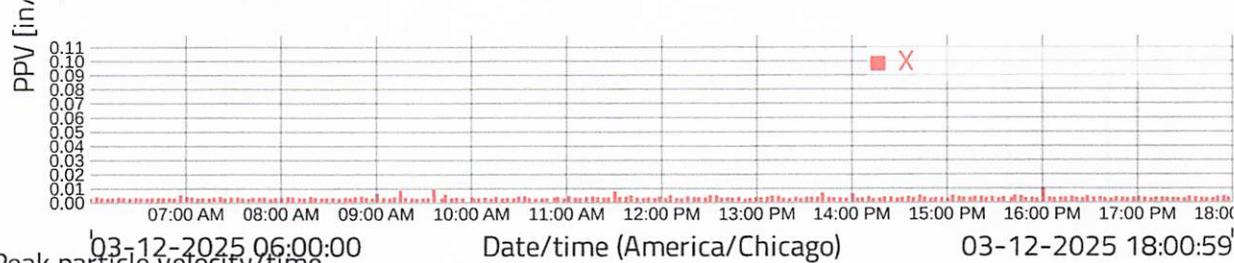
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Guideline	ISEE 250Hz
Measuring interval	6 seconds
Storage below threshold interval	60 seconds
Store values below threshold	On
Timezone	America/Chicago
Calculate VDV (Vibration Dose Value)	Off
Calculate PVS (Peak Vector Sum)	Off
Calculate PPV (Peak particle velocity)	On

Peak particle velocity/frequency

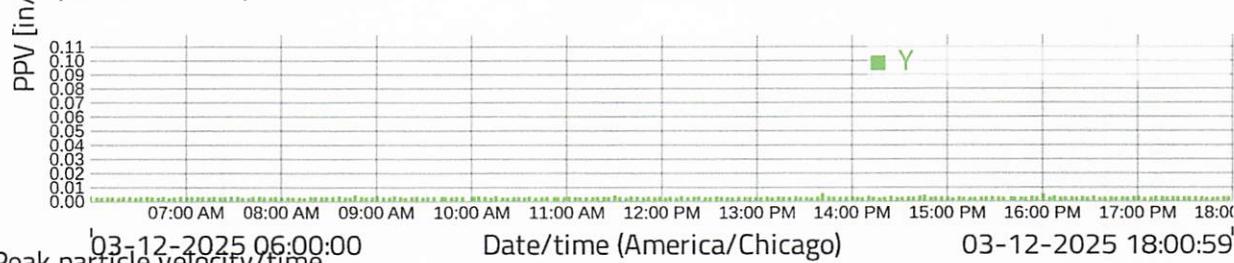


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 3, 2025 16:00:59	x	0.010	54.0
Dec. 3, 2025 13:43:59	y	0.005	7.0
Dec. 3, 2025 13:43:59	z	0.019	7.0

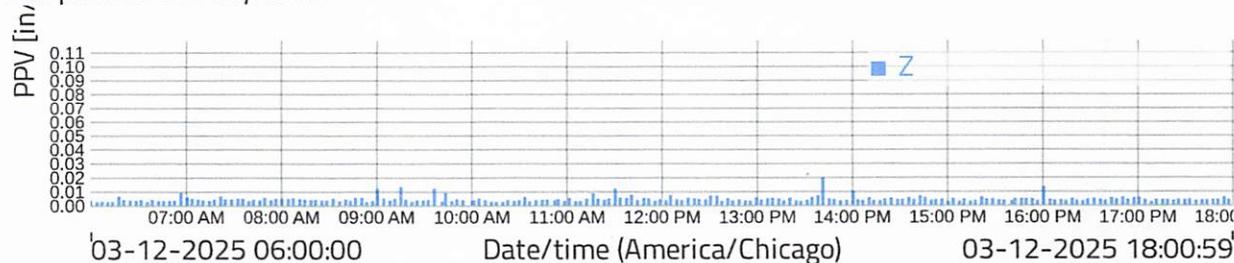
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

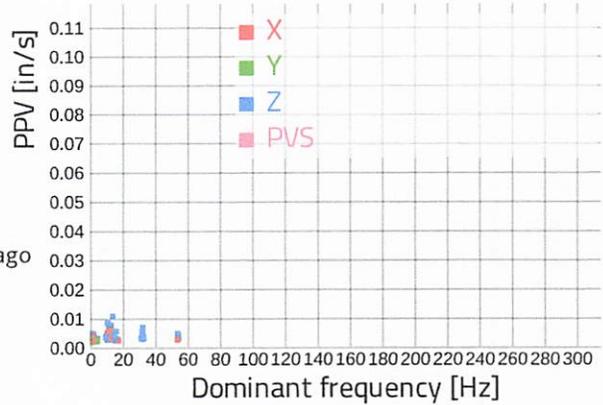


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



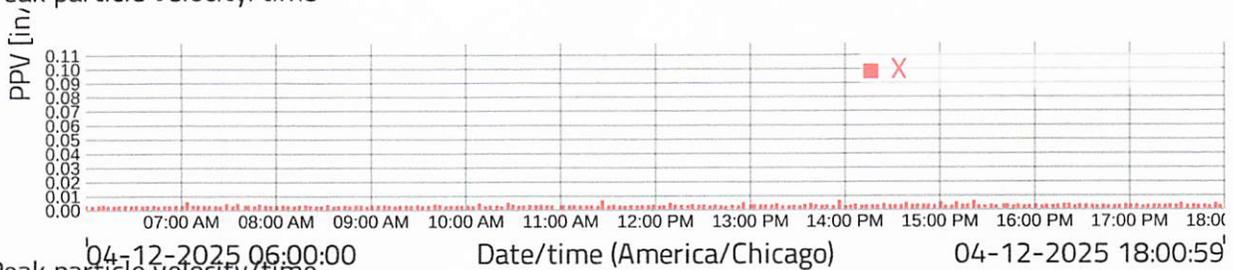
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Peak particle velocity/frequency

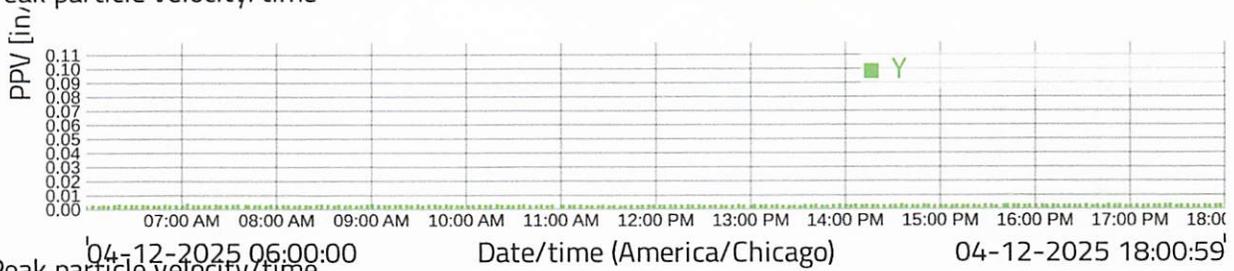


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 4, 2025 11:28:59	x	0.006	12.5
Dec. 4, 2025 07:04:59	y	0.004	1.5
Dec. 4, 2025 11:28:59	z	0.011	14.0

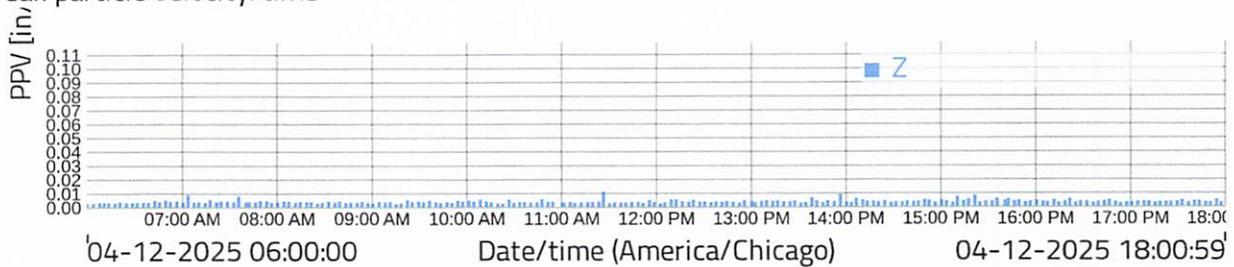
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

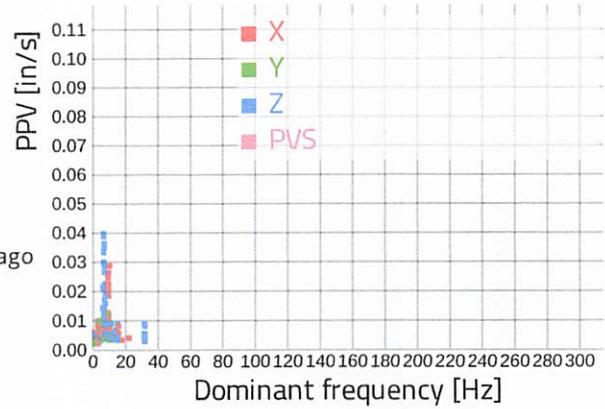


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



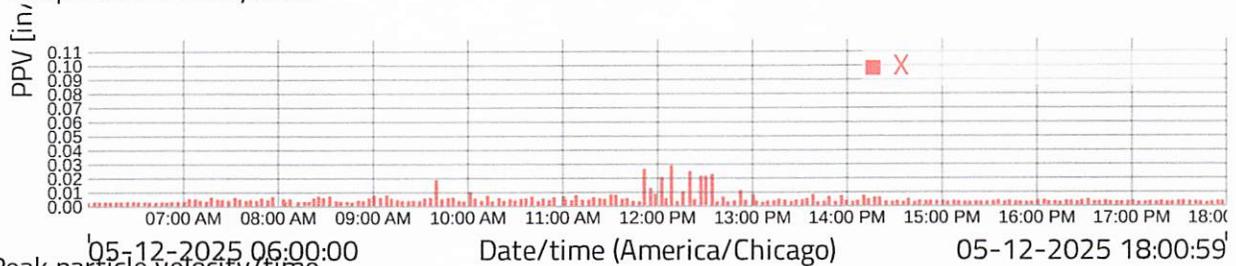
Calculate PPA (Peak particle acceleration) Off
 Evaluation type Unspecified
 Threshold for measurement storage 0.02 in/s
 PPV flat line threshold 0.5 in/s
 Guideline ISEE 250Hz
 Measuring interval 6 seconds
 Storage below threshold interval 60 seconds
 Store values below threshold On
 Timezone America/Chicago
 Calculate VDV (Vibration Dose Value) Off
 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

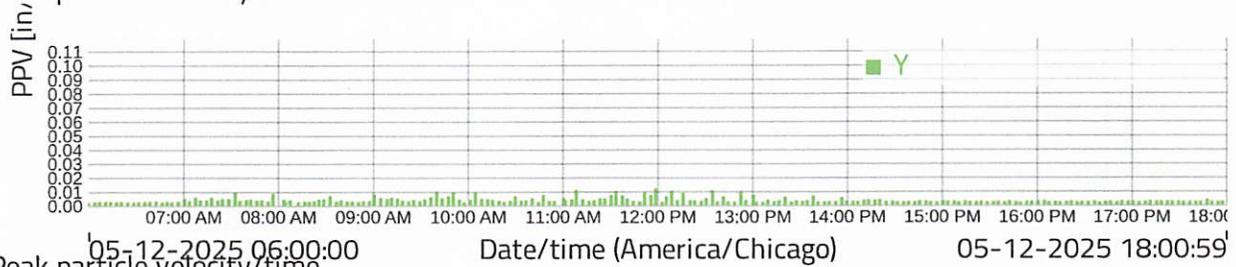


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 5, 2025 12:10:23	x	0.028	10.5
Dec. 5, 2025 11:58:59	y	0.012	10.0
Dec. 5, 2025 12:21:11	z	0.040	7.0

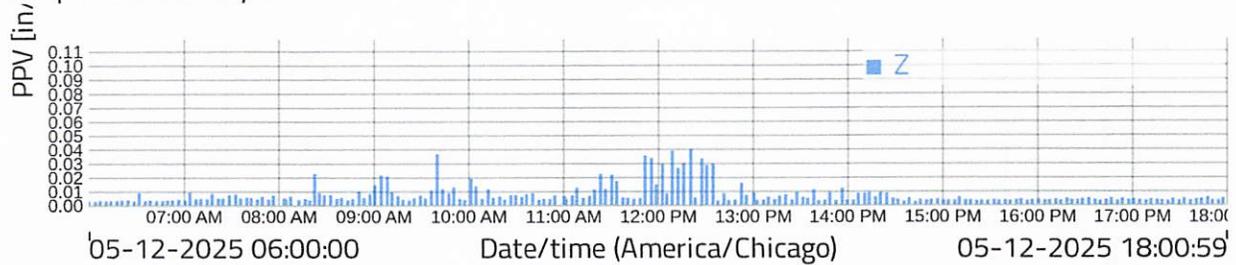
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

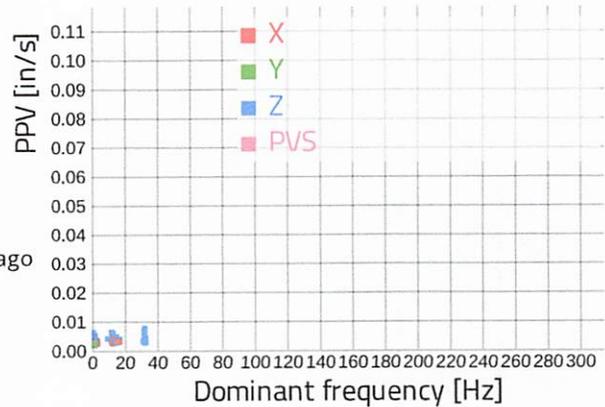


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



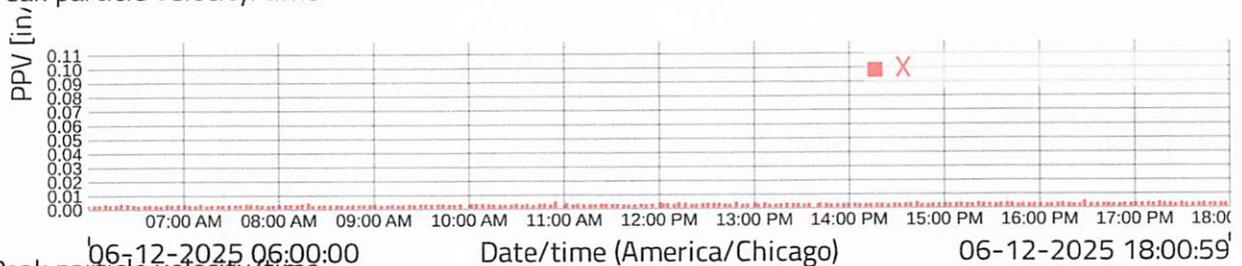
Calculate PPA (Peak particle acceleration)	Off
Evaluation type	Unspecified
Threshold for measurement storage	0.02 in/s
PPV flat line threshold	0.5 in/s
Guideline	ISEE 250Hz
Measuring interval	6 seconds
Storage below threshold interval	60 seconds
Store values below threshold	On
Timezone	America/Chicago
Calculate VDV (Vibration Dose Value)	Off
Calculate PVS (Peak Vector Sum)	Off
Calculate PPV (Peak particle velocity)	On

Peak particle velocity/frequency

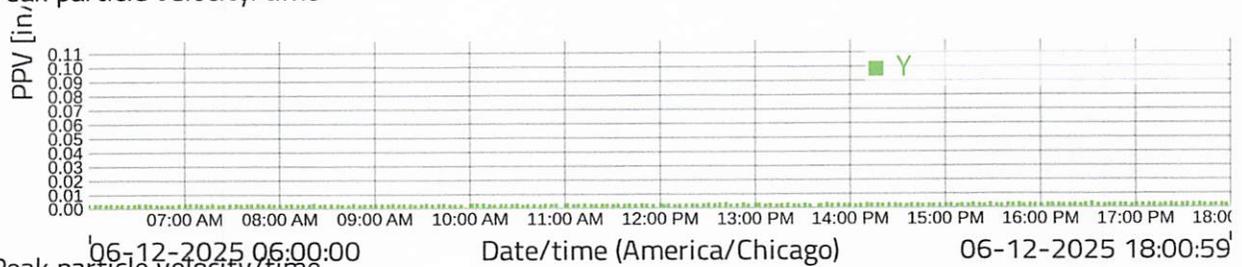


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 6, 2025 10:57:59	x	0.005	12.5
Dec. 6, 2025 16:35:59	y	0.004	1.5
Dec. 6, 2025 12:51:59	z	0.008	32.5

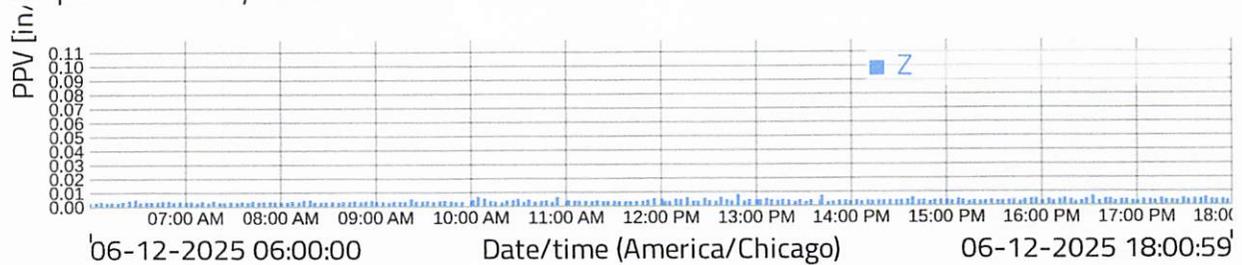
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time

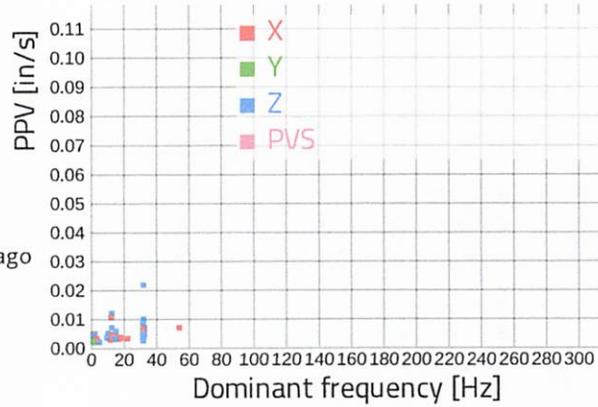


Project: LEOPARDO
 Measuring point: 507 S BLVD
 (SAPUGU)



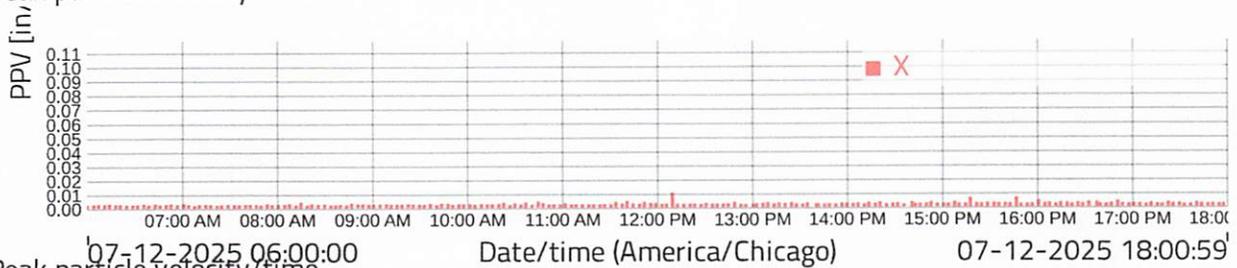
Calculate PPA (Peak particle acceleration) Off
 Evaluation type Unspecified
 Threshold for measurement storage 0.02 in/s
 PPV flat line threshold 0.5 in/s
 Guideline ISEE 250Hz
 Measuring interval 6 seconds
 Storage below threshold interval 60 seconds
 Store values below threshold On
 Timezone America/Chicago
 Calculate VDV (Vibration Dose Value) Off
 Calculate PVS (Peak Vector Sum) Off
 Calculate PPV (Peak particle velocity) On

Peak particle velocity/frequency

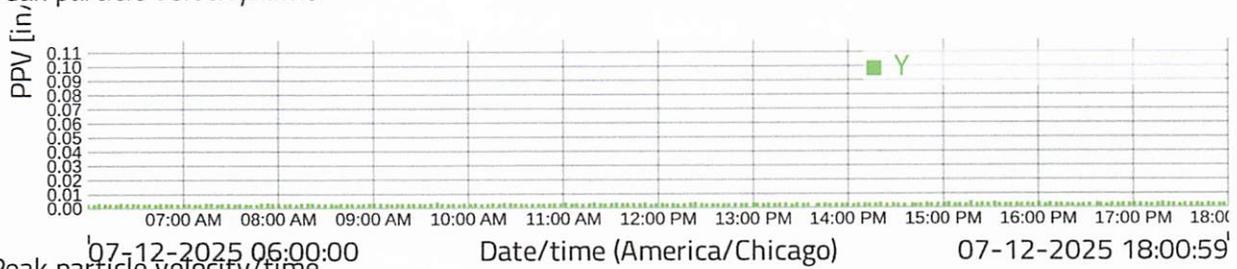


Peak readings Time	axis	PPV(in/sec)	Freq (Hz)
Dec. 7, 2025 12:09:59	x	0.010	12.5
Dec. 7, 2025 15:18:59	y	0.003	1.0
Dec. 7, 2025 14:26:47	z	0.022	32.5

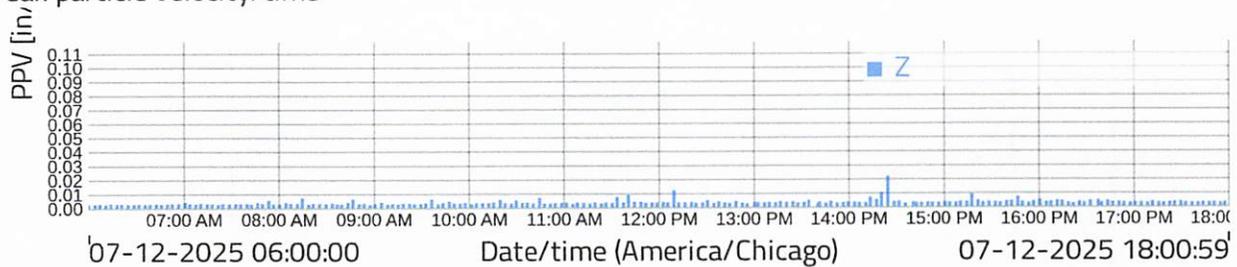
Peak particle velocity/time



Peak particle velocity/time



Peak particle velocity/time



SN: 3806 v3.22
Date: 12/01/2025 **Time:** 10:33:00
Event: 126
Client: LEOPARDO
Operation: CONSTRUCTION
Location: 504 S BLVD
Distance: 15.
Operator: CTI INC
Comment: 424 S BLVD

**Continuous Monitor Recording
Summary Data**

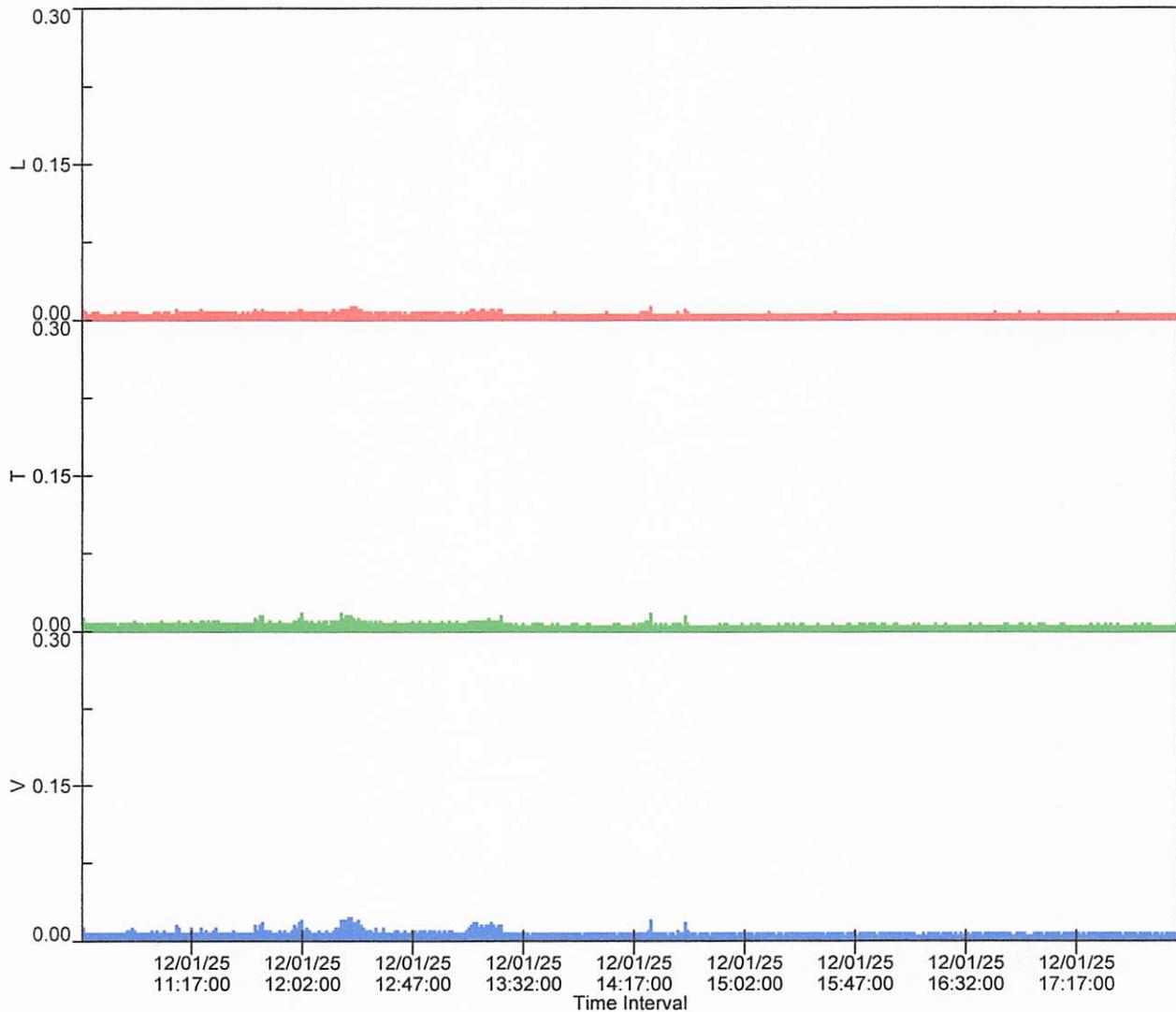
	L	T	V
PPV (in/s)	0.013	0.018	0.023
FREQ (Hz)	8.8	18.5	7.5
Peak Air Pressure:	81 db		
Recording Time:	446 minutes		
Sample Size:	1440		
Interval Size:	60 seconds		

Additional Info:

Shaketable Calibrated: 05/21/2025
By: GeoSonics Inc.
 359 Northgate Drive
 Warrendale, PA 15086 U.S.A.
 TEL: 724.934.2900 FAX: 724.934.2999

SN: 3806 Event: 126

Record Max PPV: 0.023 in/s Record Max DB: 81 db



SN: 3806 v3.22
Date: 12/02/2025 **Time:** 06:01:00
Event: 127
Client: LEOPARDO
Operation: CONSTRUCTION
Location: 504 S BLVD
Distance: 15.
Operator: CTI INC
Comment: 424 S BLVD

**Continuous Monitor Recording
Summary Data**

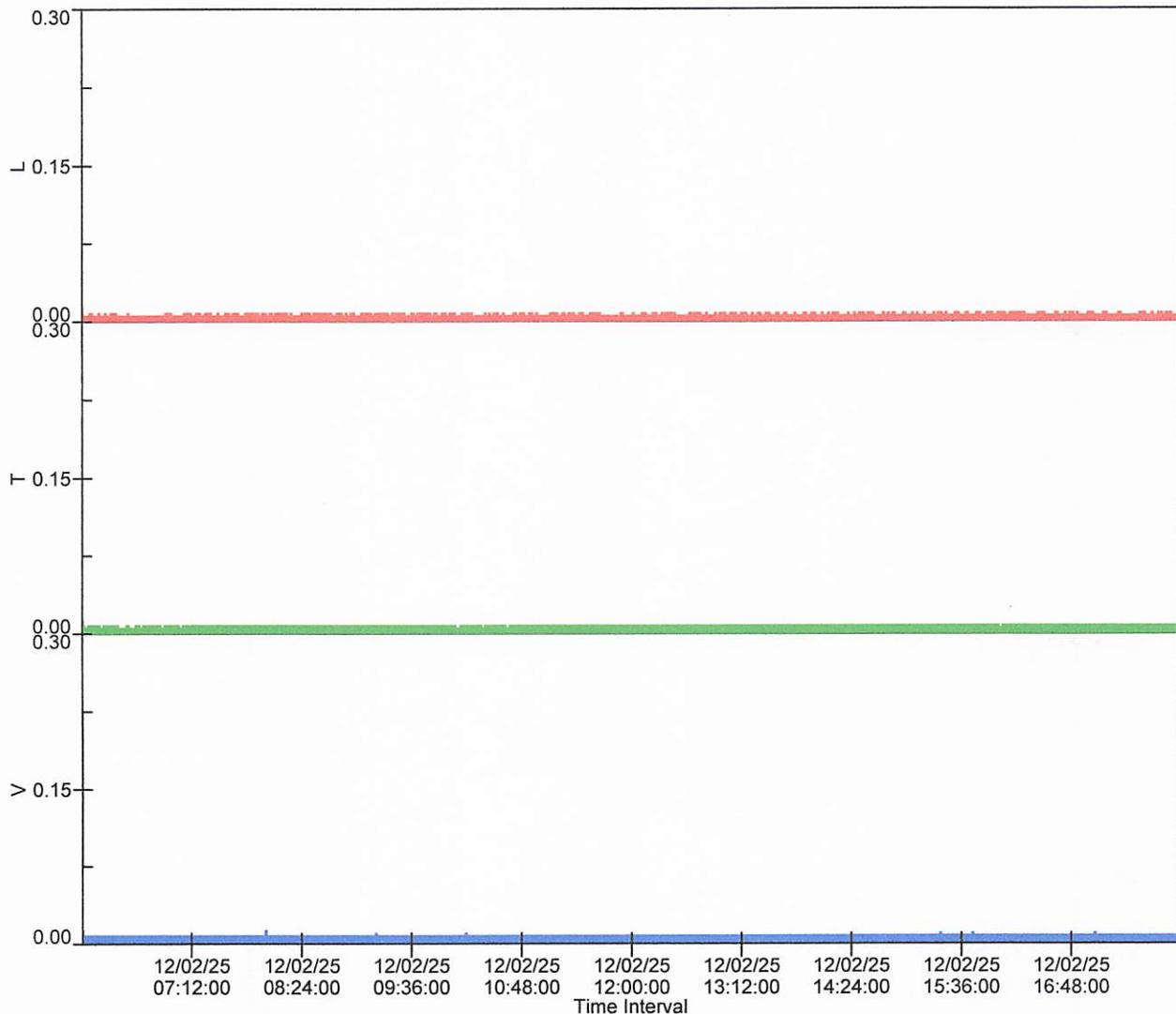
	L	T	V
PPV (in/s)	0.010	0.013	0.013
FREQ (Hz)	.3	2.3	.2
Peak Air Pressure:	82 db		
Recording Time:	718 minutes		
Sample Size:	1440		
Interval Size:	60 seconds		

Additional Info:

Shaketable Calibrated: 05/21/2025
By: GeoSonics Inc.
 359 Northgate Drive
 Warrendale, PA 15086 U.S.A.
 TEL: 724.934.2900 FAX: 724.934.2999

SN: 3806 Event: 127

Record Max PPV: 0.013 in/s Record Max DB: 82 db



SN: 3806 v3.22
Date: 12/04/2025 **Time:** 06:01:00
Event: 128
Client: LEOPARDO
Operation: CONSTRUCTION
Location: 504 S BLVD
Distance: 15.
Operator: CTI INC
Comment: 424 S BLVD

**Continuous Monitor Recording
Summary Data**

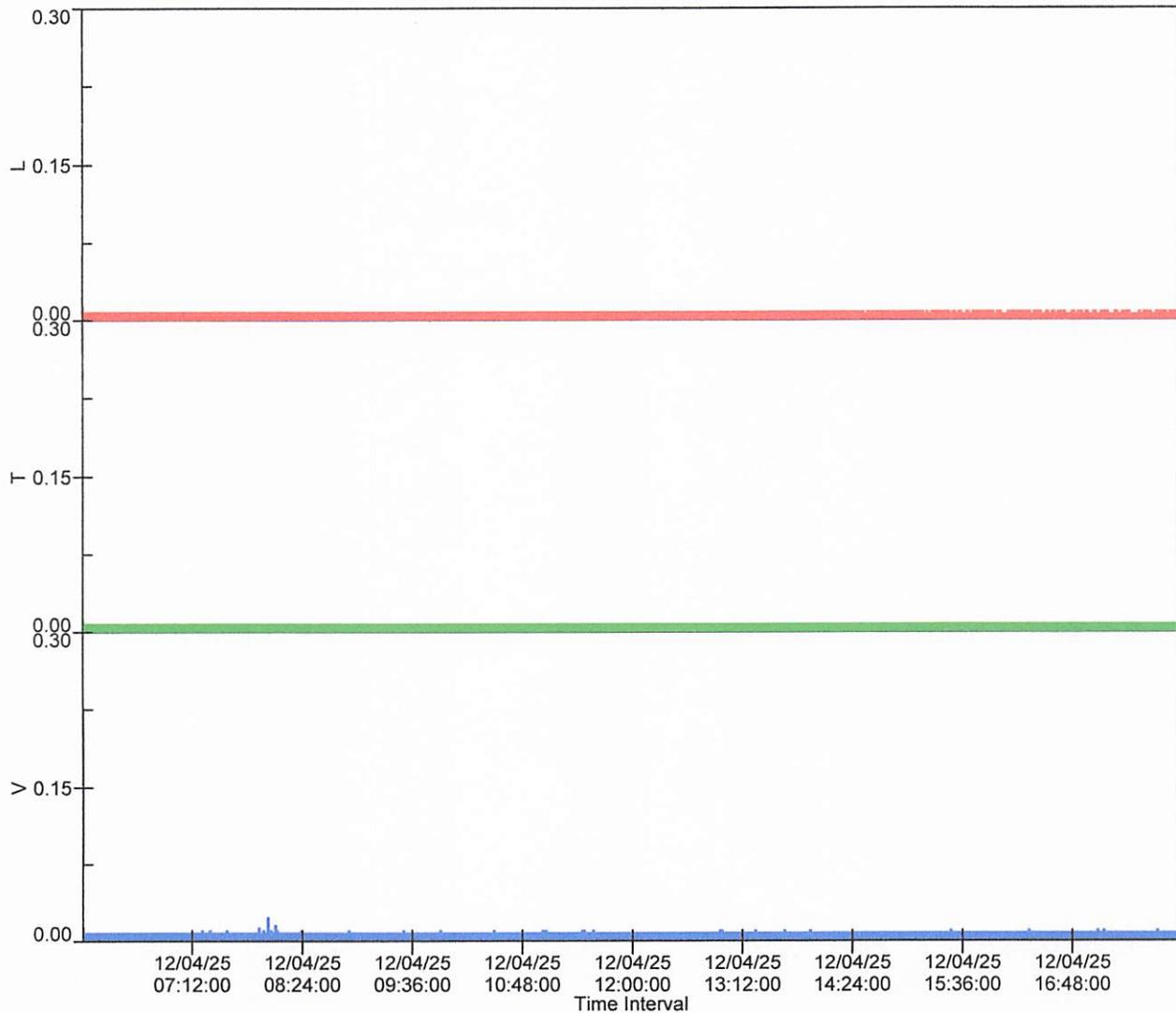
	L	T	V
PPV (in/s)	0.013	0.013	0.023
FREQ (Hz)	.4	3.0	125.0
Peak Air Pressure:	82 db		
Recording Time:	718 minutes		
Sample Size:	1440		
Interval Size:	60 seconds		

Additional Info:

Shaketable Calibrated: 05/21/2025
By: GeoSonics Inc.
 359 Northgate Drive
 Warrendale, PA 15086 U.S.A.
 TEL: 724.934.2900 FAX: 724.934.2999

SN: 3806 Event: 128

Record Max PPV: 0.023 in/s Record Max DB: 82 db



SN: 3806 v3.22
Date: 12/05/2025 **Time:** 06:01:00
Event: 129
Client: LEOPARDO
Operation: CONSTRUCTION
Location: 504 S BLVD
Distance: 15.
Operator: CTI INC
Comment: 424 S BLVD

**Continuous Monitor Recording
Summary Data**

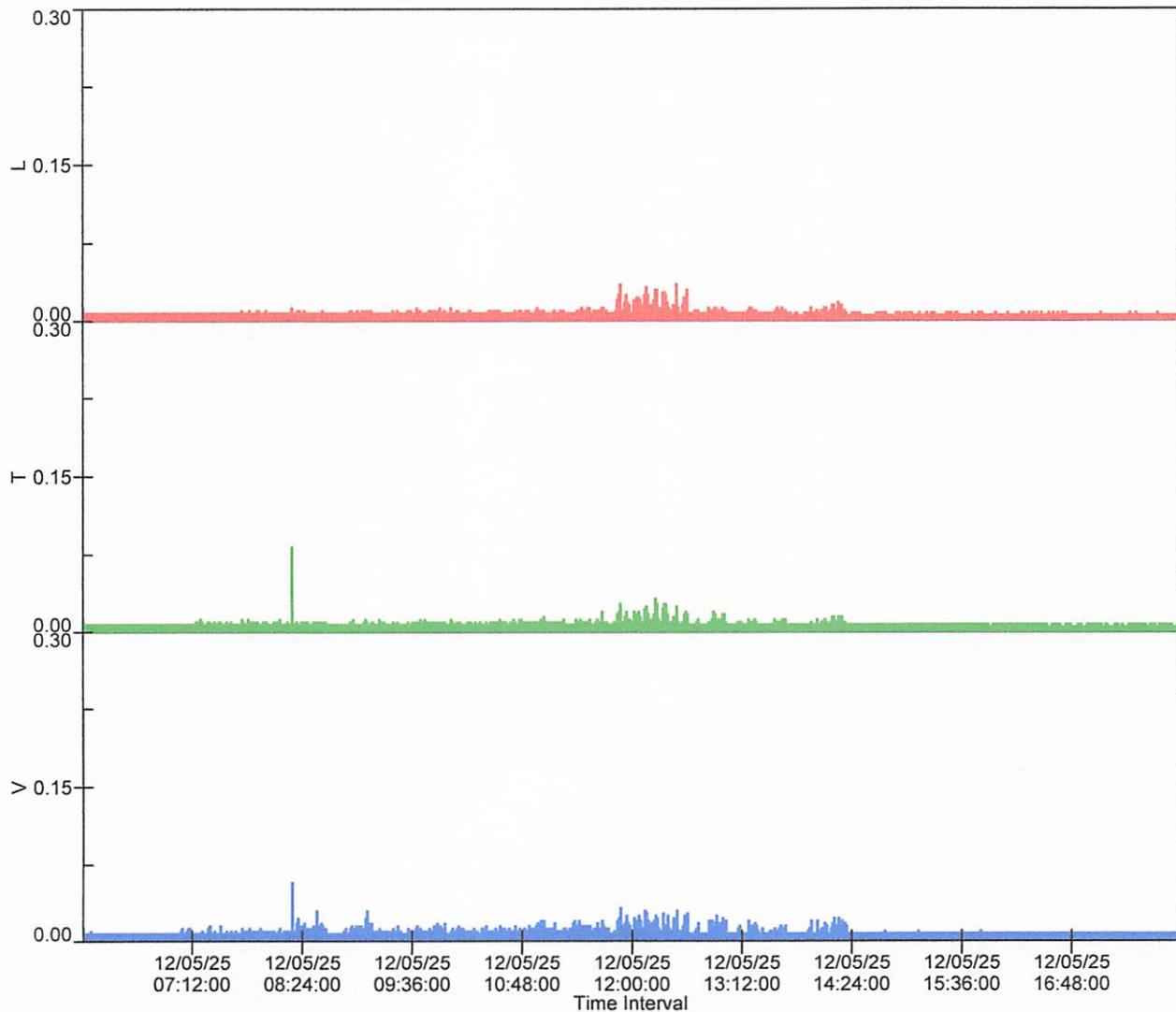
	L	T	V
PPV (in/s)	0.035	0.083	0.058
FREQ (Hz)	6.9	20.0	23.8
Peak Air Pressure:	106 db		
Recording Time:	718 minutes		
Sample Size:	1440		
Interval Size:	60 seconds		

Additional Info:

Shaketable Calibrated: 05/21/2025
By: GeoSonics Inc.
 359 Northgate Drive
 Warrendale, PA 15086 U.S.A.
 TEL: 724.934.2900 FAX: 724.934.2999

SN: 3806 Event: 129

Record Max PPV: 0.083 in/s Record Max DB: 106 db



SN: 3806 v3.22
Date: 12/06/2025 **Time:** 06:01:00
Event: 130
Client: LEOPARDO
Operation: CONSTRUCTION
Location: 504 S BLVD
Distance: 15.
Operator: CTI INC
Comment: 424 S BLVD

**Continuous Monitor Recording
Summary Data**

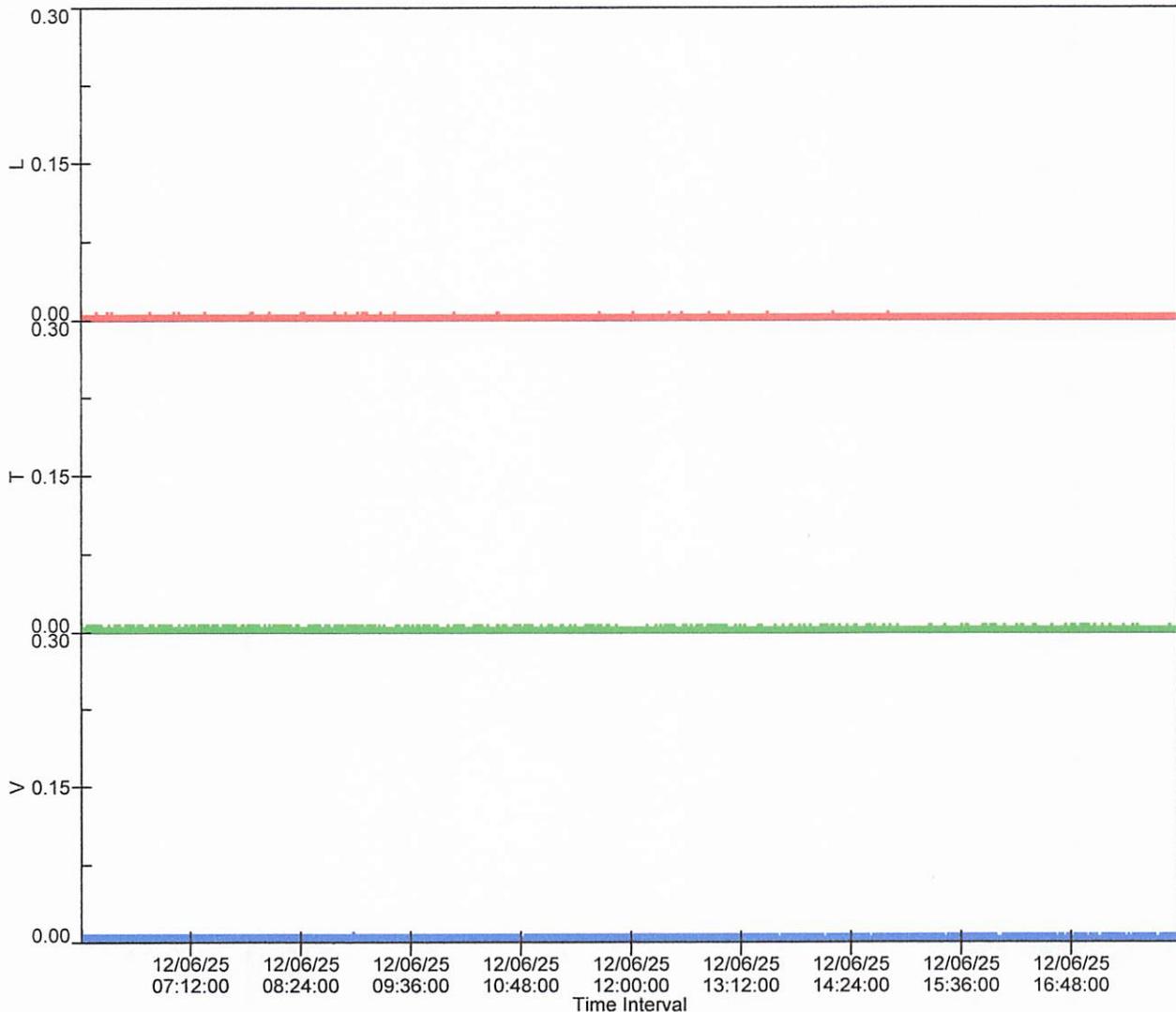
	L	T	V
PPV (in/s)	0.010	0.010	0.013
FREQ (Hz)	.3	2.4	.2
Peak Air Pressure:	102 db		
Recording Time:	718 minutes		
Sample Size:	1440		
Interval Size:	60 seconds		

Additional Info:

Shaketable Calibrated: 05/21/2025
By: GeoSonics Inc.
 359 Northgate Drive
 Warrendale, PA 15086 U.S.A.
 TEL: 724.934.2900 FAX: 724.934.2999

SN: 3806 Event: 130

Record Max PPV: 0.013 in/s Record Max DB: 102 db



SN: 3806 v3.22
Date: 12/07/2025 **Time:** 06:01:00
Event: 131
Client: LEOPARDO
Operation: CONSTRUCTION
Location: 504 S BLVD
Distance: 15.
Operator: CTI INC
Comment: 424 S BLVD

**Continuous Monitor Recording
Summary Data**

	L	T	V
PPV (in/s)	0.010	0.010	0.023
FREQ (Hz)	.3	2.2	27.8
Peak Air Pressure:	101 db		

Recording Time: 718 minutes
Sample Size: 1440
Interval Size: 60 seconds

Additional Info:

Shaketable Calibrated: 05/21/2025
By: GeoSonics Inc.
 359 Northgate Drive
 Warrendale, PA 15086 U.S.A.
 TEL: 724.934.2900 FAX: 724.934.2999

SN: 3806 Event: 131

Record Max PPV: 0.023 in/s Record Max DB: 101 db

