

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
CENTRAL ZONAL BENCH AT BHOPAL
ORIGINAL APPLICATION 35/2023(CZ)

IN THE MATTER OF:

RAJMAL GURJAR

APPLICANT

Versus

STATE OF MADHYA PRADESH & ORS.

RESPONDENTS

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1	Seismograph Report in compliance of order dated 28.01.2026	1-13

Date: 06.03.2026

Submitted by MPPCB:-

Place: Bhopal

through Counsel



Adv. Parul Bhadoria
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Solar Industries India Limited



**Metal Cladding Blast Induced AOP & Ground
Vibration Analysis at ICEM Engineering Company
Pvt. Ltd. At. Ambhori , Dist. Betul Madhya Pradesh.**

Solar Technical Services



Solar Industries India Limited

Executive Summary

ICEM Engineering Company Private Limited focused on metals sheet cladding for anticorrosive protection and metallurgical enhancement, for applications in the chemical, food, nuclear, aerospace, and shipbuilding Industries. Solar technical Services contracted by ICEM Engineering for AOP analysis and ground vibration studies, to ensure safety and compliance in explosive welding process.

Objective's

- To protect the structure integrity and ensure the compliance regulatory limits on airblast & ground vibration levels.
- To minimize community complaints and maintain operation credibility.
- To Support legal documentation and environmental compliance.

Operational Standards and DGMS Guidelines

The permissible Peak particle velocity (PPV) as per DGMS circular No.7 dt.29/08/1997 (Table 1) for domestic houses/ structure (Kuccha, brick and cement) is 5 mm/s. The safe air overpressure has been considered as 128 dB. L (Approx. 50 Pa), as per recommendations of Siskind & Summers (Bhandari, 1994)².

Table 1: Permissible Peak Particle Velocity (ppv) at the foundation level of structures in Mining Areas (in mm/s)¹

Type of structure	Dominant excitation frequency, Hz		
	<8Hz	8-25 Hz	>25 Hz
(A). Buildings/structures not belonging to the mine owner			
i. Domestic houses/structures (Kuchha, brick and cement)	5	10	15
ii. Industrial buildings (RCC & Framed Structures)	10	20	25
iii. Objects of historical importance and sensitive structures	2	5	10
(B). Building belonging to the mine owner with limited life span			
i. Domestic houses/structures (Kuchha, brick and cement)	10	15	25
ii. Industrial buildings (RCC & Framed Structures)	15	25	30

Methodology

Initially, blasting location inspection was carried out, after which temporary monitoring station were established at the point of interest (POI) for vibration and air overpressure analysis.



Fig: Vibration monitoring near the Gram panchayat

POI-1: First Instrument, UM-23366 was installed near the ICEM office at 1290 meters from the blast site (lat. & long. 21.67666, 78.299444).

POI-2: Second Instrument, UM-23366 was installed at Gram panchayat premises at 2036 meters from the blast site (lat. & long. 21.665739,78.308908).

POI-3: Third Instrument, UM-23077 was installed near Navodaya School at 3204 meters from the blast site (lat. & long. 21.66028,78.27276).

The blast was executed as per design, and three instruments recorded vibration and air overpressure generated by the blast.

Observation & Results

There are three instruments has been mounted to record the blast ground vibration and Air overpressure. The recorded blast induced ground vibration and air overpressures are mentioned below:

S.No.	Instrument S.no.	Monitoring Location	Distance From the blasting site	MCPD (kgs)	AOP (Pa. L)	PPV (mm/s)
1.	UM-23364	Near ICEM Office	1290 m	190	<0.5	1.80
2.	UM-23366	In Gram panchayat	2036 m	190	<0.5	1.59
3.	UM-23077	Navodaya School	3204 m	190	<0.5	<0.127

*Detailed reports are attached in **Annexure 1**

MCPD: Maximum charge per delay

PPV: Peak particle velocity or vibration

AOP: Air overpressure



Fig: Vibration monitoring near the Navodaya school

The measured ground vibration values in ICEM office, Gram panchayat and Navodaya School were **1.80 mm/s**, **1.59 mm/s** and less than **0.127 mm/s** respectively, while the air overpressure recorded by all the instruments was less than **0.5 pa**. These values well within the permissible limit.

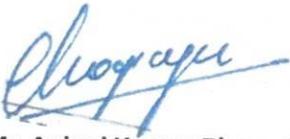
Conclusion

- a) All recorded Peak Particle Velocity (PPV) and air overpressure (AOP) values remained within permissible limits as per regulatory standards.
- b) No structural damage, or adverse effects observed on the metal cladding or nearby building.

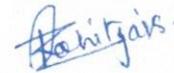
Acknowledgement

We extend our sincere thanks to ICEM Engineering management and all individuals who provided their valuable support and cooperation in the successful completion of vibration and air overpressure (AOP) analysis.

- Solar Industries India Ltd.



Mr. Anjani Kumar Bhograju
Technical Services Engineer



Mr. Rohit Jaiswal
Technical Services Engineer

References

1. DGMS, Damage to the structures due to blast induced ground vibration in the mining areas. S&T Circular No. 7, Directorate General of Mines Safety, Dhanbad, 1997, pp. 9-12.
2. Bhandari S., "Air overpressure due to blasting and its control", Proceedings of International Conference on Environmental issues in Minerals and Energy industry, New Delhi, 24-26 Oct, pp.300-307



Event Report

Waveform Trigger Source
Trigger Level(s)
Trigger Level (Mic)
Pre-Trigger/Record Time
Sample Rate
Setup File Name
Operator

MicL at January 20, 2026 14:36:49
 Geo 0.127 mm/s
 Mic 2.00 pa, 100 dB(L)
 0.25 sec/4.0 sec (Fixed)
 1024 sps
 factory.MMB
 Operator

Serial Number
Model Number
Battery Level
Unit Calibration
Event File Name
USB Sensor Support

UM23364
 Micromate ISEE 10.90FB
 3.8 volts
 December 10, 2025 by UES New Delhi
 UM23364_20260120143649.IDFW
 Disabled

Notes

Location: ICEM ENGINEERING
 Client:
 User Name: ICEM ENG
 General:

Post Event Notes No text to be displayed.

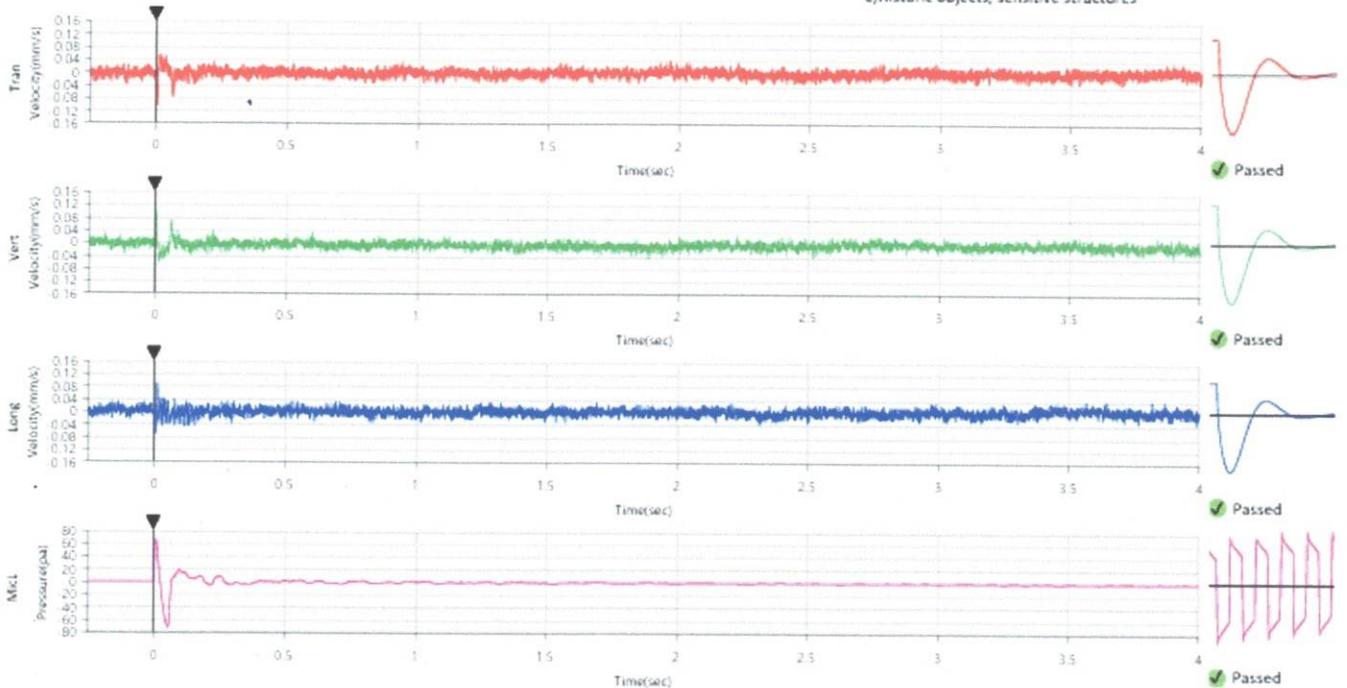
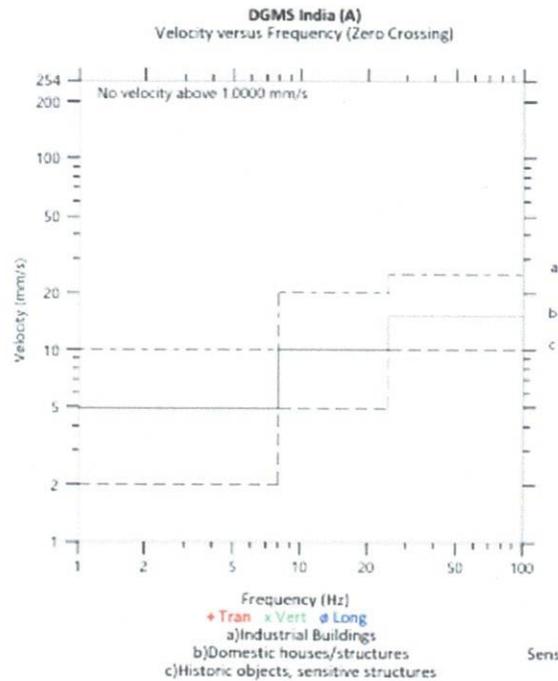
Geophone

	Tran	Vert	Long
Peak Particle Velocity	1.805 mm/s	1,514 mm/s	1,568 mm/s
Peak Particle Velocity	56.1292 dB	59.0083 dB	54.9096 dB
Zero Crossing Frequency	19.7 Hz	21.6 Hz	20.9 Hz
Time (Relative to Trigger)	2.317 sec	2.396 sec	1.641 sec
Peak Acceleration	0.046 g	0.046 g	0.039 g
Peak Displacement	0.015 mm	0.018 mm	0.014 mm
Sensor Check	✓ Passed	✓ Passed	✓ Passed
Frequency	7.3 Hz	7.3 Hz	7.3 Hz
Overswing Ratio	4.4	4.1	4.3

Peak Vector Sum 2.554 mm/s at 0.005 sec

ISEE Linear Microphone

Peak Sound Pressure Level	<0.5 pa
Peak Sound Pressure Level	<88 dB(L)
Time (Relative to Trigger)	0.999 sec
Zero Crossing Frequency	1.7 Hz
Sensor Check	✓ Passed
Frequency	20.5 Hz
Test Amplitude	1199 mv





FFT Report

Waveform Trigger Source
Trigger Level(s)
Trigger Level (Mic)
Pre-Trigger/Record Time
Sample Rate
Setup File Name
Operator

Mic1 at January 20, 2026 14:36:49
Geo 0.127 mm/s
Mic 1.00 pa, 100 dB(L)
0.25 sec/4.0 sec (Fixed)
1024 sps
factory.MMB
Operator

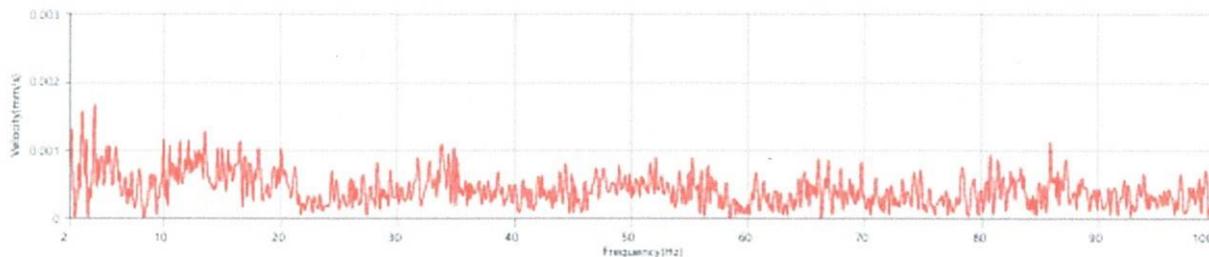
Serial Number
Model Number
Battery Level
Unit Calibration
Event File Name
USB Sensor Support

UM23364
Micromate ISEE 10 90FB
3.8 volts
December 10, 2025 by UES New Delhi
UM23364_20260120143649.IDFW
Disabled

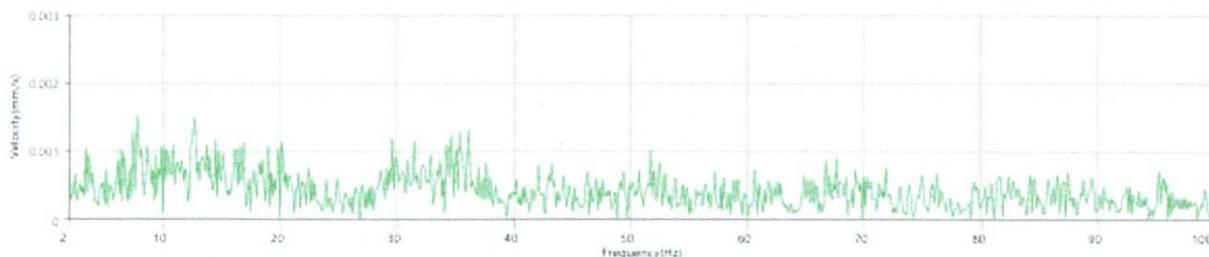
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Location: ICEM ENGINEERING
Client:
User Name: ICEM ENG
General:

Post Event Notes No text to be displayed.

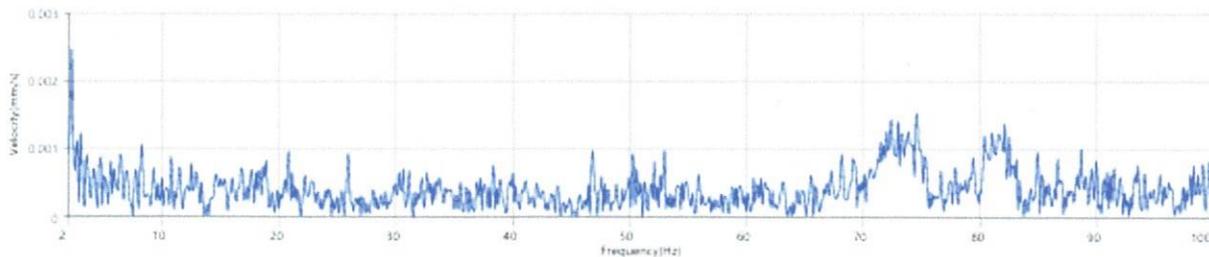
Tran - Dominant Frequency 9.8 Hz, Amplitude 0.195 mm/s (Peak Particle Velocity: 1.805 mm/s)



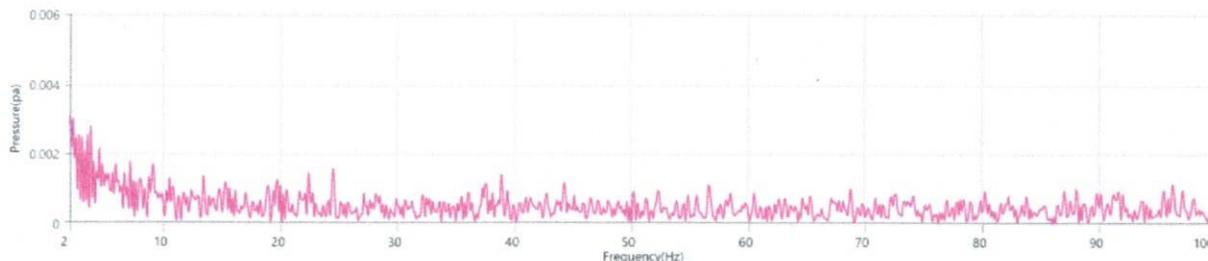
Vert - Dominant Frequency 24.2 Hz, Amplitude 0.306 mm/s (Peak Particle Velocity: 1.514 mm/s)



Long - Dominant Frequency 11.0 Hz, Amplitude 0.130 mm/s (Peak Particle Velocity: 1.568 mm/s)



Mic1 - Dominant Frequency 2.0 Hz, Amplitude 0.00 pa (Peak Sound Pressure Level: 0.11 pa)





Event Report

Waveform Trigger Source
 Trigger Level(s)
 Trigger Level (Mic)
 Pre-Trigger/Record Time
 Sample Rate
 Setup File Name
 Operator

MicL at January 20, 2026 14:37:04
 Geo 0.127 mm/s
 Mic 2.00 pa, 100 dB(L)
 0.25 sec/4.0 sec (Fixed)
 4096 sps
 factory.MMB
 Operator

Serial Number
 Model Number
 Battery Level
 Unit Calibration
 Event File Name
 USB Sensor Support

UM23366
 Micromate ISEE 10.90GC
 3.8 volts
 December 10, 2025 by UES New Delhi
 UM23366_20260120143704.IDFW
 Disabled

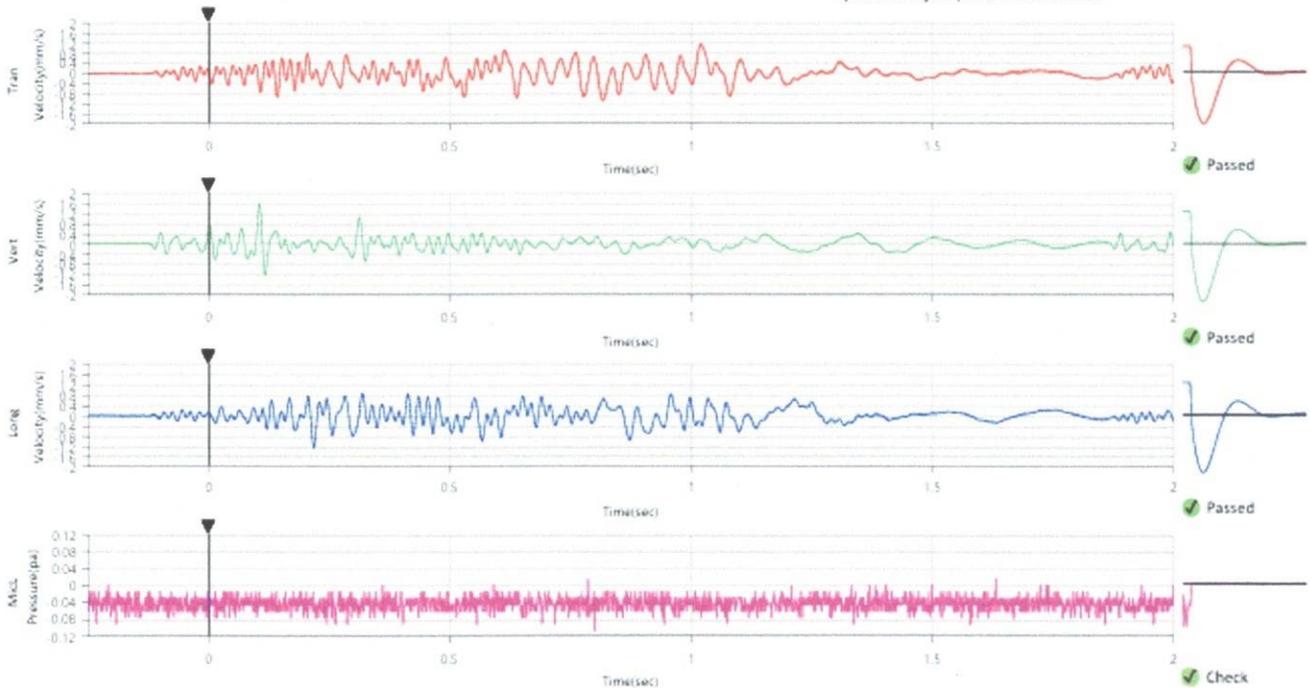
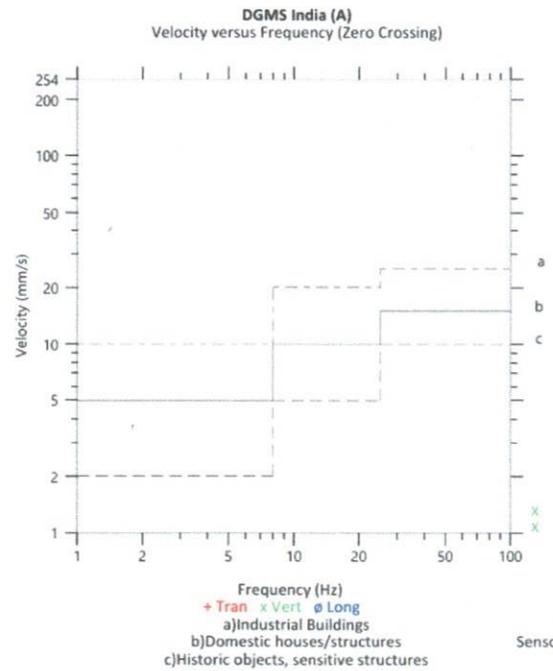
Post Event Notes No text to be displayed.

Geophone	Tran	Vert	Long
Peak Particle Velocity	1.143 mm/s	1.592 mm/s	1.253 mm/s
Peak Particle Velocity	52.1599 dB	55.0396 dB	52.9605 dB
Zero Crossing Frequency	16.5 Hz	36.6 Hz	39.4 Hz
Time (Relative to Trigger)	1.021 sec	0.105 sec	0.219 sec
Peak Acceleration	0.027 g	0.038 g	0.030 g
Peak Displacement	0.012 mm	0.010 mm	0.017 mm
Sensor Check	✓ Passed	✓ Passed	✓ Passed
Frequency	7.3 Hz	7.5 Hz	7.3 Hz
Overswing Ratio	4.2	4.1	4.2

Peak Vector Sum 1.728 mm/s at 0.105 sec

ISEE Linear Microphone
 Peak Sound Pressure Level
 Peak Sound Pressure Level
 Time (Relative to Trigger)
 Zero Crossing Frequency
 Sensor Check
 Frequency
 Test Amplitude

<0.5 pa
 <88 dB(L)
 0.801 sec
 24.4 Hz
 ✓ Check
 0.0 Hz
 0 mv





FFT Report

Waveform Trigger Source
Trigger Level(s)
Trigger Level (Mic)
Pre-Trigger/Record Time
Sample Rate
Setup File Name
Operator

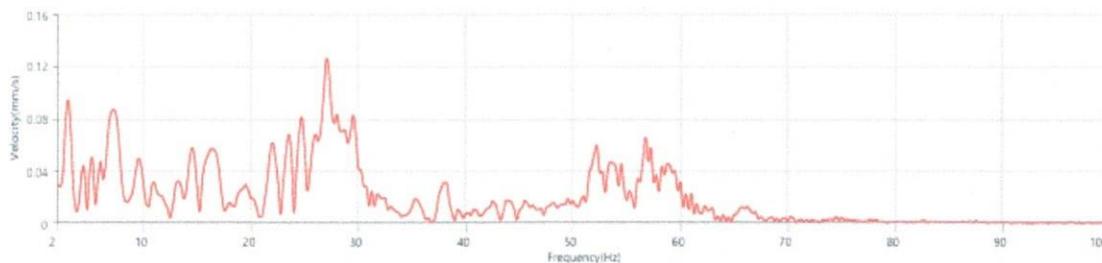
Mic1 at January 20, 2026 14:37:04
Geo 0.127 mm/s
Mic 2.00 pa, 100 dB(L)
0.25 sec/4.0 sec (Fixed)
4096 sps
factory.MMB
Operator

Serial Number
Model Number
Battery Level
Unit Calibration
Event File Name
USB Sensor Support

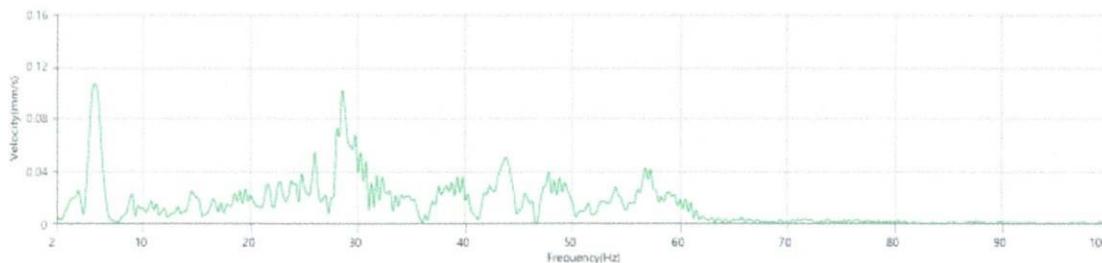
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Micromate ISEE 10 90GC
3.8 volts
December 10, 2025 by UES New Delhi
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Post Event Notes No text to be displayed.

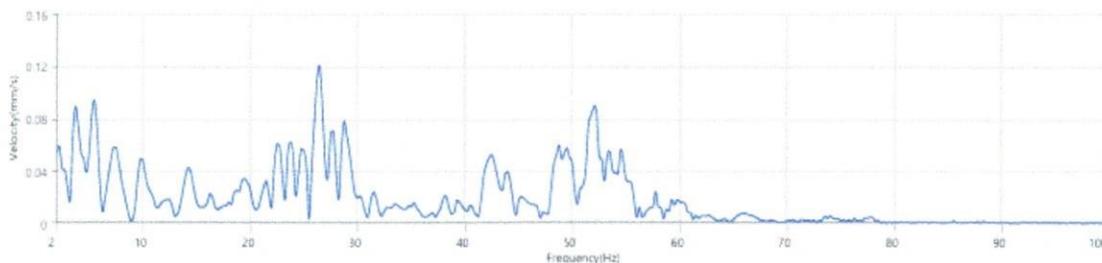
Tran - Dominant Frequency 27.0 Hz, Amplitude 0.125 mm/s (Peak Particle Velocity: 1.143 mm/s)



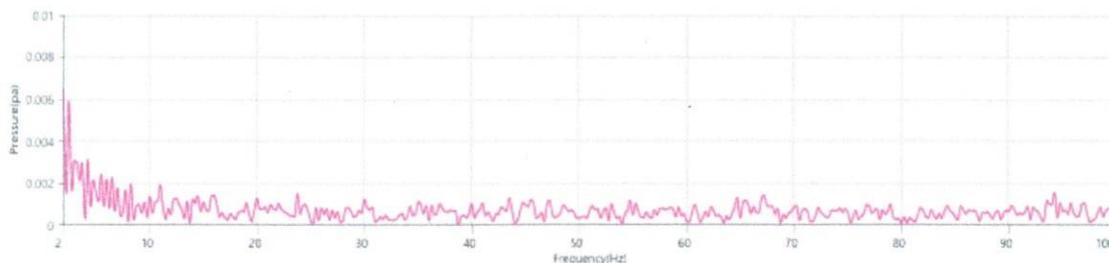
Vert - Dominant Frequency 5.5 Hz, Amplitude 0.107 mm/s (Peak Particle Velocity: 1.592 mm/s)



Long - Dominant Frequency 26.5 Hz, Amplitude 0.119 mm/s (Peak Particle Velocity: 1.253 mm/s)



Mic1 - Dominant Frequency 2.0 Hz, Amplitude 0.01 pa (Peak Sound Pressure Level: 0.11 pa)





Event Report

Waveform Trigger Source
 Trigger Level(s)
 Trigger Level (Mic)
 Pre-Trigger/Record Time
 Sample Rate
 Setup File Name
 Operator

MicL at January 20, 2026 14:38:41
 Geo 0.300 mm/s
 Mic 2.00 pa, 100 dB(L)
 0.50 sec/4.0 sec (Fixed)
 4096 sps
 factory.MMB
 Operator

Serial Number
 Model Number
 Battery Level
 Unit Calibration
 Event File Name
 USB Sensor Support

UM23077
 Micromate ISEE 10.90FB
 3.6 volts
 February 4, 2025 by UES New Delhi
 UM23077_20260120143841.IDFW
 Disabled

Notes

Location: NAVODAY SCHOOL ICEM
 Client: ICEM
 User Name: ICEM ENGINEERING
 General:

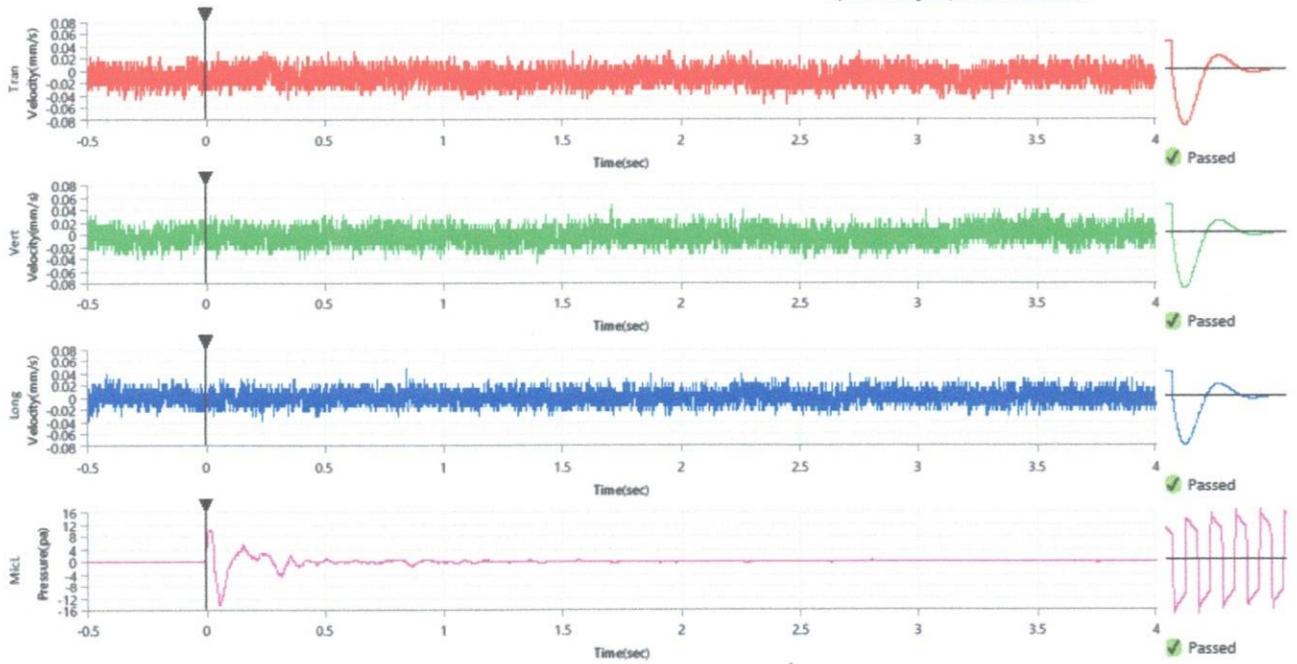
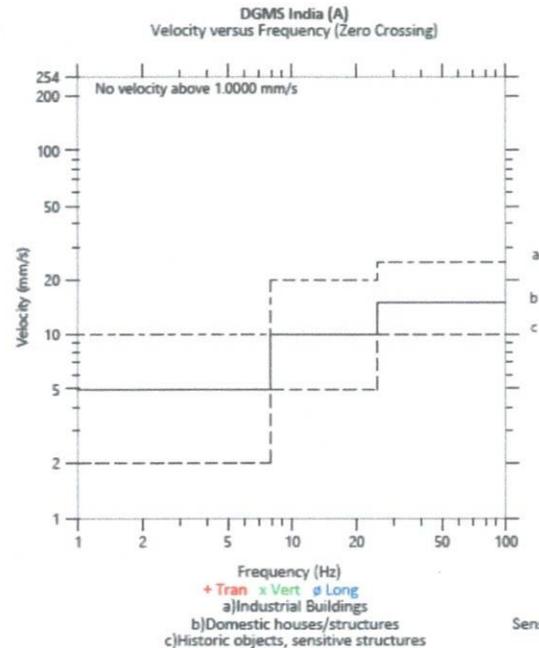
Post Event Notes No text to be displayed.

Geophone	Tran	Vert	Long
Peak Particle Velocity	<0.127 mm/s	<0.127 mm/s	<0.127 mm/s
Peak Particle Velocity	25.8345 dB	24.4956 dB	24.4956 dB
Zero Crossing Frequency	>100 Hz	>100 Hz	>100 Hz
Time (Relative to Trigger)	2.354 sec	1.396 sec	0.845 sec
Peak Acceleration	0.020 g	0.020 g	0.016 g
Peak Displacement	0.000 mm	0.000 mm	0.000 mm
Sensor Check	✓ Passed	✓ Passed	✓ Passed
Frequency	7.3 Hz	7.3 Hz	7.3 Hz
Overswing Ratio	4.4	4.4	4.3
Peak Vector Sum	0.060 mm/s at 2.518 sec		

ISEE Linear Microphone

Peak Sound Pressure Level
 Peak Sound Pressure Level
 Time (Relative to Trigger)
 Zero Crossing Frequency
 Sensor Check
 Frequency
 Test Amplitude

<0.5 pa
 <88 dB(L)
 3.160 sec
 64.0 Hz
 ✓ Passed
 19.7 Hz
 1353 mv





FFT Report

Waveform Trigger Source
 Trigger Level(s)
 Trigger Level (Mic)
 Pre-Trigger/Record Time
 Sample Rate
 Setup File Name
 Operator

MicL at January 20, 2026 14:38:41
 Geo 0.300 mm/s
 Mic 2.00 pa, 100 dB(L)
 0.50 sec/4.0 sec (Fixed)
 4096 sps
 factory MMB
 Operator

Serial Number
 Model Number
 Battery Level
 Unit Calibration
 Event File Name
 USB Sensor Support

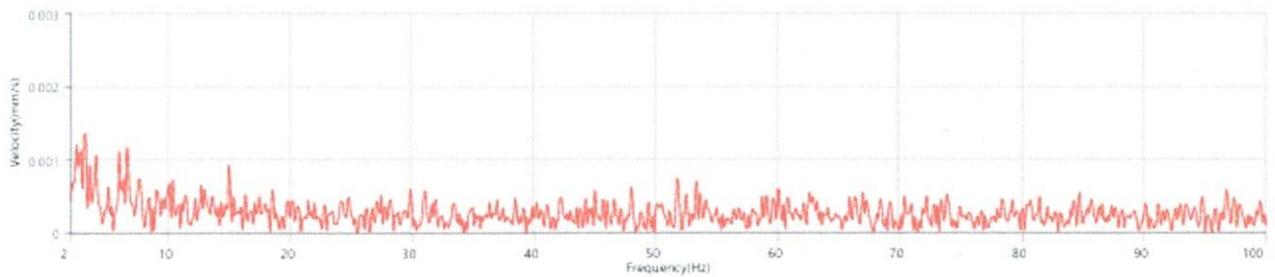
UM23077
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 3.6 volts
 February 4, 2025 by UES New Delhi
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 Disabled

Notes

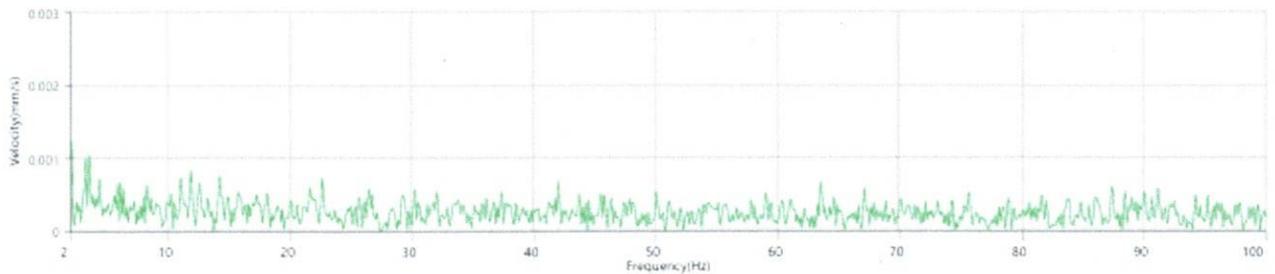
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Post Event Notes No text to be displayed.

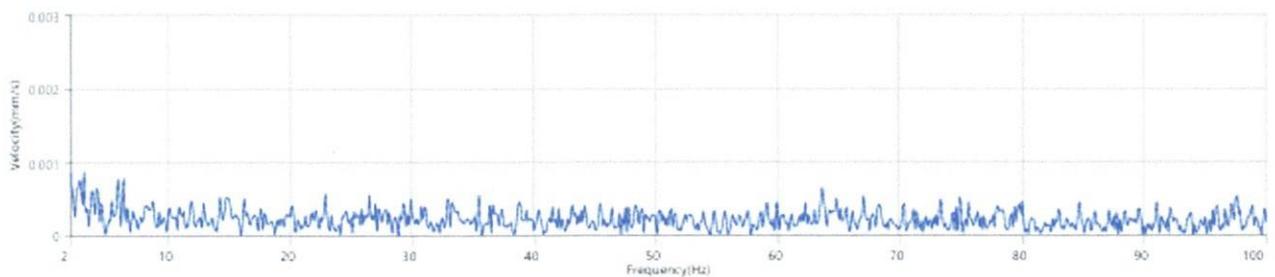
Tran - Dominant Frequency 3.2 Hz, Amplitude 0.001 mm/s (Peak Particle Velocity: 0.055 mm/s)



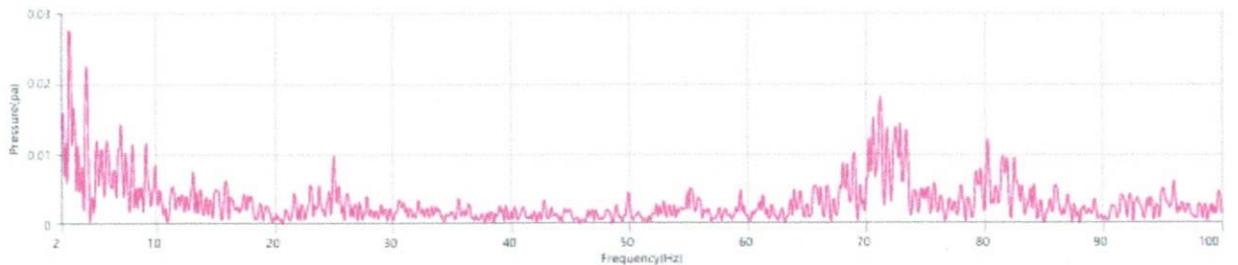
Vert - Dominant Frequency 2.1 Hz, Amplitude 0.001 mm/s (Peak Particle Velocity: 0.047 mm/s)



Long - Dominant Frequency 3.1 Hz, Amplitude 0.001 mm/s (Peak Particle Velocity: 0.047 mm/s)



MicL - Dominant Frequency 2.6 Hz, Amplitude 0.03 pa (Peak Sound Pressure Level: 0.43 pa)



N K Pingale

From: N K Pingale
Sent: Wednesday, February 18, 2026 12:15 PM
To: 'Regional Office Chhindwara MPPCB'
Subject: ICEM Seismograph Report
Attachments: Scan0449.pdf; ICEM Seismograph report.pdf

PFA

Thanks & Regards
N.K.Pingale
For ICEM Engineering Co. PVT. LTD.
Location:- Multai

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