

**Project Title:**

Scientific study and advice for controlled blasting practices to minimize ground vibration, fly-rock, Air overpressure at Gere Stone Mine of M/s Katyayni Contractors Pvt. Ltd.

**Project No.:** CNP/4942/2019-20

**EXECUTIVE SUMMARY**

This report relates to the study conducted by CSIR-Central Institute of Mining and Fuel Research, Dhanbad on Advice for controlled blasting practices to minimize blast induced ground vibration, fly-rock, air-overpressure at Gere Stone Mine of M/s Katyayni Contractors Pvt. Ltd. The results of investigation, analyses of data and recommendations, made thereof, are summarised below:

- ❖ Ten (10) blasts were conducted at different benches of the Gere Stone Mine of M/s Katyayni Contractors Pvt. Ltd. and forty (40) ground vibration data were recorded at different locations in the vicinity of inhabitant's area lying nearby.
- ❖ The maximum level of vibration recorded at the Rasuna village was 3.599 mm/s with dominant peak frequency of 38.56 Hz at 158 m distance from the blast face. The vibration was recorded at House of Sri Nanak Manjhi. The ground vibration recorded from the same blast at the house of Sri Narayan Manjhi (175 m) was 2.048 mm/s with dominant frequency of 41.31 Hz. In this blast 167 kg of explosive were distributed in 10 holes and were detonated with explosives weight per delay of 16.7 kg.
- ❖ The maximum air over-pressures recorded from production blast was 127.2 dB(L) at 158 m from the blast conducted at Spot 3(1) bench of Gere Stone Mine of M/s Katyayni Contractors Pvt. Ltd. The blast design details and recorded vibration and air over pressure data are presented in annexure as Tables A1 and A2 respectively.

- ❖ All the recorded vibration and air overpressure data at concerned locations were well within the safe limits. There was no ejection of flyrocks during the study period. Nonel initiation system has added advantages in comparison to D-cord initiation system because it detonates the explosives in the blast holes from the bottom of the hole at sub-grade level and reduces the ejection of fly rocks significantly.
- ❖ The recorded dominant peak frequencies of vibrations were in the range of 11.38 – 89.81 Hz. So, the safe level of vibration has been taken as 10 mm/s for the safety of houses/structures of the surrounding villages and 15 mm/s for the structures belonging to the mine as per DGMS standard. Keeping in view the greater safety of the structures/houses in the nearby villages, the safe level of vibration has been taken as 5 mm/s for the safety of houses/structures not belonging to Gere Stone Mine.
- ❖ The propagation equation for the prediction of blast vibration has been established and is given as Equation 1. The permissible explosives weight per delay may be computed from the equation to contain vibration within safe limits for the distances of houses/structures concerned. For convenience, the permissible explosives weight to be detonated in a delay and total explosive weight to be detonated in a round has been computed and has been presented in annexure as Table A3. The predicted peak particle velocity levels at various distances due to detonation of explosives weight per delay of 15 kg, 20 kg, 25 kg and 30 kg is given in annexure as Table A4.
- ❖ Recommended blast designs are given annexure as Figures A1-A2 which should be followed in day to day blasting operations with judicious modifications.