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Local Consideration for Blast-Induced Ground Vibration in Mining Communities

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The mining industry relies on drill and blast operations to liberate rocks for metallurgical processing. These operations if not mitigated can drive mines into serious social license and environmental consequences in communities sensitive to blast-induced ground vibration.

The $83 billion mineral industry is fast growing with demand for energy transition minerals -- recording 2.78% production increase since June 2022 (Trading Economics). With this, there is rising expectation of the mining industry for green and sustainable metals. The minerals education coalition in 2021 estimated an average of 40,630 pounds of mineral product consumption per person in the United States alone. This demand re-emphasizes the need for mining operations to meet growing demands by increasing production targets even in hard and difficult grounds or those in close proximity to communities.

From pre-feasibility stages into the life of a mine, social license to operate is key to a successful mine, and issues of blast-induced ground vibration arise. By understanding the behavior of rocks to blast-induced waves, civil and geotechnical mitigation strategies could be adopted by considering rock structure and behavior under dynamic loading conditions.

This study considers meta-sedimentary and igneous rocks under field-representative loading and unloading, deformation, damage accumulation, and active ultrasonic wave propagation to suggest advancements in building designs and sustainable material solutions for local structures to remain resilient throughout the life of the mine.