

"VIBRATION CRITERIA FOR SURFACE MINE BLASTING: TEN YEARS AFTER BUREAU OF MINES R1 8507"

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ABSTRACT

In the early 1980's, the Bureau of Mines published four reports of structural response and damage from surface mine blasting, vibration monitoring, and analysis methods. These findings replaced simpler and less restrictive Bureau criteria dating back to 1962 for ground vibration and 1943 for airblast.

Although these studies were done in response to industry needs, the reports received a mixed reception by the mining industry. In particular, RI 8507 on ground vibration appeared to support more restrictive regulations, while also increasing the complexity of analyses by emphasizing the importance of vibration frequency for both measurement and structure response. All this resulted from an attempt to provide technically realistic and selective criteria based on key vibration characteristics. In spite of the concerns about increased restriction back in 1981, these studies have since been widely adopted by the users and regulators of explosives to develop and demonstrate safe blasting practices. In the ten years since their publication, nothing has appeared to replace them or even significantly add to the data base.

These Bureau studies were milestones in blasting technology, but some important work still remains to be done. The industry "knows" what is safe but needs guidance on how to obtain safe levels through blast design.

Blast designs for vibrations control received limited study by the Bureau (e.g., RI 9026). Bureau publications and other studies hint at ways to control vibrations (as well as fragmentation and throw) by precision initiation timing and other design changes. In addition, vibration criteria for nonresidential cases are needed; concrete, power poles, pipelines, bridges, etc. Without reliable criteria for such cases, regulation is often based on relatively strict levels required to prevent cosmetic damage to residences.