

## Introduction

This chapter is an introduction to blasting techniques based primarily on the *Explosives and Blasting Procedures Manual* (Dick et al., 1967) and the *Blaster's Handbook* (E. J. de Funt de Nemours & Co., Inc., 1976). Blast design is not a precise science. Because of widely varying properties of rock, geologic structure, and explosives, design of a blasting program requires field testing. Theoretically, it is possible to make a design for the best blast for a given geologic situation. This chapter provides the fundamental concepts of blast design. These concepts are useful as a first approximation for blast design and also in troubleshooting the cause of a bad blast. Field testing is the best tool to refine individual blast designs.

Throughout the blast design process, two overriding principles must be kept in mind:

- (1) Explosives function best when there is a free face approximately parallel to the explosive column at the time of detonation.
- (2) There must be adequate space for the broken rock to move and expand. Excessive confinement of explosives is the leading cause of poor blasting results such as backbreak, ground vibrations, airblast, unbroken toe, flyrock, and poor fragmentation.

## Properties and Geology of the Rock Mass

The rock mass properties are the single most critical variable affecting the design and results of a blast. The