

REDUCING ACCIDENTS THROUGH IMPROVED BLASTING SAFETY

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ABSTRACT

The Bureau of Mines investigated three of the major causes of mine blasting accidents: inadequate blast area security, excessive flyrock, and misfires.

Accidents resulting from inadequate blast area security occur during scheduled blasting because of failure to clear the blast zone, inadequate guarding, and failure of personnel to follow instructions, retreat to a safe location, and/or take adequate cover.

Excessive flyrock is produced when there is too much explosive energy for the amount of burden, stemming is inadequate, or the explosive energy is too rapidly vented through a zone of weakness in the rock. Geology, improper blast design, or carelessness can cause unwanted flyrock. The operator must change blasting methods when shooting in geology that favors the production of flyrock.

Most misfire accidents are caused by drilling into bootlegs in underground metal and nonmetal mines. Improper disposing of misfires is the second most frequent cause of misfire accidents, and some accidents are due to impact initiation of explosives in the muckpile. Misfires are usually caused by misunderstanding, improper use, or some failure of the initiation system. Other causes are cutoffs, insufficient firing current, inadequate priming, improper explosive storage, and damage to the initiation system.

INTRODUCTION

Analysis of mine blasting accidents shows that the five most frequent causes of accidents are premature blasts, inadequate blast area security, excessive flyrock, misfires, and fumes. Over 70 pct of all blasting accident injuries from 1978 through 1985 have been caused by three of these: inadequate blast area security, flyrock, and misfires, all of which are discussed in this paper, based on earlier Bureau of Mines research (1-3).

Each mining operation has a normal flyrock range, the distance from the blast at which flyrock can be expected, based on blasting experience at that operation. The distance of the normal flyrock range will vary from a few feet in an area strip coal mine blast to more than a mile with poorly controlled shots. A safety factor is added to the normal flyrock range to determine the blast area to be cleared and secured before the blast is detonated. Rock that travels beyond the secured blast area is excessive flyrock (fig. 1). A distinction is made between injuries that occur within the established blast area and injuries that are the result of excessive flyrock projected beyond the blast area.