

BUREAU OF MINES SURFACE MINE BLASTING RESEARCH

By Dennis V. D'Andrea, Research Supervisor,
Twin Cities Research Center, Bureau of Mines, Minneapolis, MN .

ABSTRACT

The Bureau of Mines Twin Cities Research Center has a comprehensive research program on the efficient and safe application of explosives in mining. Researchers combine an understanding of the basic principles of dynamic rock fragmentation with new blast design technology and recent developments in both methods and equipment, for potential improvements in blasting practices. This paper outlines surface mine blasting research completed since the Bureau's last Technology Transfer seminar on blasting in December 1980. Three programmatic areas--productivity technology, blasting vibrations, and blasting safety--are reviewed.

HISTORY OF RESEARCH

Blasting research has been conducted at the Twin Cities Research Center (TCRC) since the center opened in 1959. Research during the 1960's and early 1970's established TCRC as the leading Bureau of Mines center in the area of blasting for improved fragmentation and increased productivity. During the period from fiscal year 1974 through fiscal year 1979, productivity research was on blasting to prepare ore bodies for in situ leaching. The major effort at TCRC from fiscal year 1975 through fiscal year 1983 was in the area of environmental effects of blasting (ground vibrations and airblast). Research since fiscal year 1983 has been mostly on blasting fundamentals for improvements in productivity. Blasting safety research began at TCRC as one contract project in fiscal year 1978 and grew to involve four in-house projects during the years 1984 to 1986.

The heavily field-oriented blasting research program at TCRC has included 45 in-house and contract project efforts since 1975, resulting in 122 publications and numerous presentations at professional meetings. Report of Investigations (RI) 8507, on structural response and damage from blasting vibrations, won the 1981 Applied Research Award from the U.S. National Committee for Rock Mechanics. TCRC personnel have responded to over 650 requests for technical assistance and advice on blasting since 1981.

CURRENT RESEARCH PROGRAM

Mining Technology

Major research efforts at TCRC on improved productivity and blasting vibrations in surface mines are listed in table 1. Included are projects intended to improve mining productivity and to provide information on good blasting practices. The projects that started in the late 1970's addressed environmental issues, with indirect implications for mining costs and productivity. More recent long-range, high-risk research is examining the