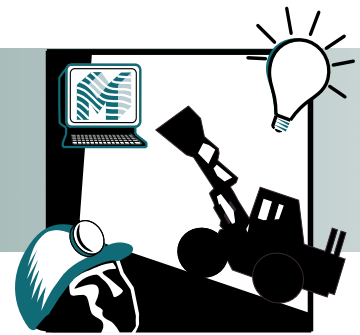


# MINING

## Project Fact Sheet



## PROJECTILE BASED EXCAVATION

### BENEFITS

- Maximizes extraction of quality ore and avoids low grade or environmentally sensitive areas with localized approach
- Improves efficiency of loading and transporting by increasing the “packing” density of the broken ore
- Eliminates oversized materials immediately
- Reduces the amount of material that must be sent to the crusher for grinding

### APPLICATION

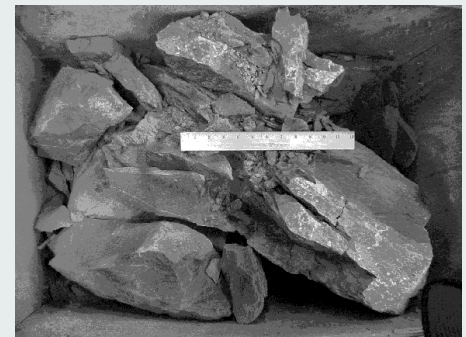
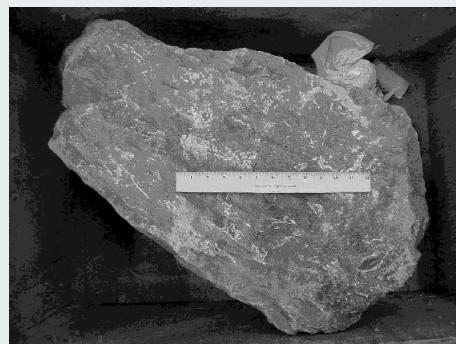
Major goals of the mining industry are to develop new technologies to improve the efficiency of the mineral production process and improve the safety and efficiency of the extraction process. Projectile based excavation is a low cost system for rapid and efficient excavation that is applicable to all forms of surface and underground mining.

## PROJECTILE BASE EXCAVATION COULD ELIMINATE PRIMARY CRUSHING

The Projectile Excavation (ProjEX) system represents a new alternative to drilling and blasting that shows potential for significant cost and energy savings. Current drilling and blasting techniques require many safety considerations, are highly disturbing to the local environment, and are energy intensive. ProjEX is based on two major developments from Advanced Power Technologies, Inc. (APTI) that include projectiles designed for maximum volumetric breakup and launchers using electrical energy rather than conventional propellant. It is expected that the ProjEX system will reduce the cost per ton of spoil generated and will also save energy during the processing of ore, specifically in the crushing and grinding phase. This could potentially eliminate the need for primary crushing.

In addition to reducing costs, ProjEX offers the potential of even greater savings in energy during ore processing. First, the localized nature of the technique permits complex drilling patterns to ensure that only the highest grade ore is mined. Increasing the average ore grade represents an immediate improvement in productivity and reduces the amount of waste material. More importantly, through the proper selection of projectile design, velocity and shot spacing, ProjEX offers an opportunity to control spoil size, increasing material loading efficiency, and reducing the energy for ore processing. This results in significant energy savings.

### LIMESTONE ROCK



Limestone rock before and after shot.



## Project Description

**Objective:** To develop a novel, low cost projectile system for the rapid, efficient, excavation of rocks and ore in both surface and underground mines by using projectiles launched by electrical energy rather than by conventional drilling and blasting. Energy is saved because drilling is not required and the ore is more selectively excavated and broken up into smaller sizes.

The concept of projectile excavation in itself is not new and has been shown to be effective in breaking rock. The ProjEX system deviates dramatically from older concepts. The enabling technology of this project is the coupling of efficient projectiles with highly efficient electric propulsion.

## Progress and Milestones

This project includes the following activities:

Phase I will accomplish three items. They are:

- 1 Development of a low cost projectile.
- 2 Field and laboratory firing and testing of the various projectile designs and gun operating parameters.
- 3 Performance analysis and economic viability study based on the data from the testing.

Phase II will accomplish three items. They are:

- 1 Using results from Phase I, integrate an appropriate electric propulsion system into the test gun system.
- 2 Test and evaluate combined systems both in the lab and in the field.
- 3 Roll results into an overall ProjEX system design.

Phase III will accomplish two items. They are:

- 1 Building and testing a full ProjEX system.
- 2 Test system in the field both as an individual system and evaluated for integration with the overall mining process.



### PROJECT PARTNERS

Advanced Power Technologies,  
Inc.  
Washington, DC

Baker Hughes Mining Tools  
Grand Prairie, TX

Lafarge Corporation  
Reston, VA

University of Utah  
Salt Lake City, UT

### FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Office of Industrial Technologies  
Clearinghouse  
Phone: (800) 862-2086  
Fax: (360) 586-8303  
clearinghouse@ee.doe.gov

Visit our home page at  
[www.oit.doe.gov/mining](http://www.oit.doe.gov/mining)

Office of Industrial Technologies  
Energy Efficiency  
and Renewable Energy  
U.S. Department of Energy  
Washington, D.C. 20585



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