

RESOURCES & ENVIRONMENT

Mapping Coal with Sound

"Seismic Mapping for Coal" by C. Melvin Lepper and Frank Ruskey, in *Coal Age* (Aug. 1977), 1221 Avenue of the Americas, New York, N.Y. 10020.

The safety and cost of underground coal mining depend heavily on natural formations beneath the earth's surface. Until recently, these have been difficult to determine in advance. Sand deposits within seams of coal, often the remains of ancient stream channels, have caused many of the roof cave-ins that trap and kill miners. Geologic faults in the earth's strata pose similar problems.

By modifying the seismic mapping techniques used for many years by the oil industry for deep probes of 2,000 to 33,000 feet, the U.S. Bureau of Mines has developed a new technique for charting subsurface formations in the shallower, coal-bearing strata.

According to Lepper and Ruskey, Bureau scientists, the technique requires 8 to 24 sensors (or geophones) attached by cable to a special digital recording system. A small explosion is triggered. It sends seismic waves through the earth, which then bounce off coal deposits and other formations. The geophones detect the reflected signals, reproducing them on magnetic tape. With data from several geophone lines, a computer can generate a three-dimensional "picture" (see illustration) showing coal seams, channel and sand patterns, and other features of subsurface geology.

The technique now in use can produce pictures of coal deposits at a depth of 82 to 660 feet, with an accuracy of plus or minus 3 feet. Gaining such information costs the equivalent of perhaps 1 cent per ton of mined coal; the data not only can be used to improve mine safety but also to reveal the location of usable coal deposits and reserves.

Seismic waves recorded by parallel lines of geophones (A, B, and C) can be used to create three-dimensional "pictures" of sand channels and other formations running underground through seams of coal.

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Coal Age.

