Contract No.: B2532532
Technology: In-seam Seismic Method
Contractor: Pennsylvania State University

Summary of technology:

The in-seam seismic method determines the travel time of reflected channel waves to locate reflection surfaces such as mine voids. Reflected channel waves attenuate less rapidly than other types of waves in a layered medium such as coal seam, increasing the detection range.

Stated limitations of technology:

This study is a continuation of Phase 1 work. The shortcomings of the earlier work are present in this phase of work: namely, the ambiguous signal and dispersive characteristics of the reflective signal. The plane reflective surface was located using the elliptical void mapping method. Further developments in the area of the mapping method and modeling should be completed to make the technique useful and applicable in void detection in advance of mining.

In addition, since the test equipment is not intrinsically safe, the test can only be set up in a fresh air entry. The method also requires installation of sensor pairs (at 90 degree orientation) in multiple boreholes, which is labor-intensive and time-consuming.

Field demonstration results:

Field Demonstration Conditions	Goal of Demonstration	Results of Demonstration
Nolo Mine; 4-foot-thick coal seam; 400 feet deep	Locate mine entries filled with air	Detected entries; predicted location within 20 feet; 120-foot-thick barrier pillar.
Nolo Mine; 4-foot-thick coal seam; 400 feet deep	Locate mine entries filled with air	Detected entries; predicted location within 20 feet; 180-foot-thick barrier pillar.
Black King Mine; 3-foot-thick coal seam; 600 feet deep	Locate mine entries filled with air	Detected entries; predicted location within 30 feet; 100-foot-thick barrier pillar.
Cumberland Mine; 7-foot-thick coal seam; 800 feet deep	Locate mine entries filled with air	Detected entries; predicted location within 15 feet; 200-foot-thick barrier pillar.