

Use of Electrical Resistivity to Detect Underground Mine Voids in Ohio

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ABSTRACT

Electrical resistivity surveys were completed at two sites along State Route 32 in Jackson and Vinton Counties, Ohio. The surveys were done to determine whether the electrical resistivity method could identify areas where coal was mined, leaving air- or water-filled voids. These voids can be local sources of potable water or acid mine drainage. They could also result in potentially dangerous collapse of roads or buildings that overlie the voids. The resistivity response of air- or water-filled voids compared to the surrounding bedrock may allow electrical resistivity surveys to delineate areas underlain by such voids.

Surface deformation along State Route 32 in Jackson County led to a site investigation, which included electrical resistivity surveys. Several highly resistive areas were identified using axial dipole-dipole and Wenner resistivity surveys. Subsequent drilling and excavation led to the discovery of several air-filled abandoned underground mine tunnels.

A site along State Route 32 in Vinton County, Ohio, was drilled as part of a mining permit application process. A mine void under the highway was instrumented with a pressure transducer to monitor water levels. During a period of high water level, electrical resistivity surveys were completed. The electrical response was dominated by a thin, low-resistivity layer of iron ore above where the coal was mined out. Nearby overhead powerlines also affected the results.