

PROJECT PROFILE

GEOPHYSICAL CHARACTERIZATION OF ABANDONED MINE WORKINGS, CLARION, PENNSYLVANIA

**Client: GeoMechanics, Inc.
Elizabeth, PA**

Then the National Development Company (NDC), a leading Western Pennsylvania development and construction firm specializing in institutional and educational facilities, and Allen & O'Hara, Inc., the oldest and most respected developer and manager of student housing in the country, joined forces to develop, finance, and construct new student housing on the



Field setup of the Syskal DC resistivity equipment manufactured by Iris Instruments

campus of Clarion University, they did not expect that their construction activities would be impacted by the discovery of abandoned mine workings. Construction had already commenced when backhoe excavations revealed the presence of previously unknown shallow mine workings (depth 20- 50 feet) in the 5-foot thick Lower Clarion Coal seam.

The basic problem facing the developer was that the extent of the mine workings was unknown, construction had already started and the site covered 65 acres. If a conventional program of drilling to map the mine voids had been followed, construction could not proceed on schedule and the investigation would have been costly. D'Appolonia and GeoMechanics

worked together to combine a program of geophysics and boreholes to identify the extent of the abandoned mine workings.

37 DC resistivity profiles have been obtained with a multi-electrode measurement system manufactured by Iris Instruments of Orleans, France. The readings were made using a pole-dipole configuration with up to 24 electrodes separated by either 15 or 30 feet for a total linear distance of nearly 16,000 linear feet. Seven blocks of data were processed as three-dimensional blocks using the RES3DINV program.

The basic results were that the geophysical survey was effective in targeting borings where mine workings might be present. Perhaps more significantly, the geophysical results depicted where mining is unlikely to be present.

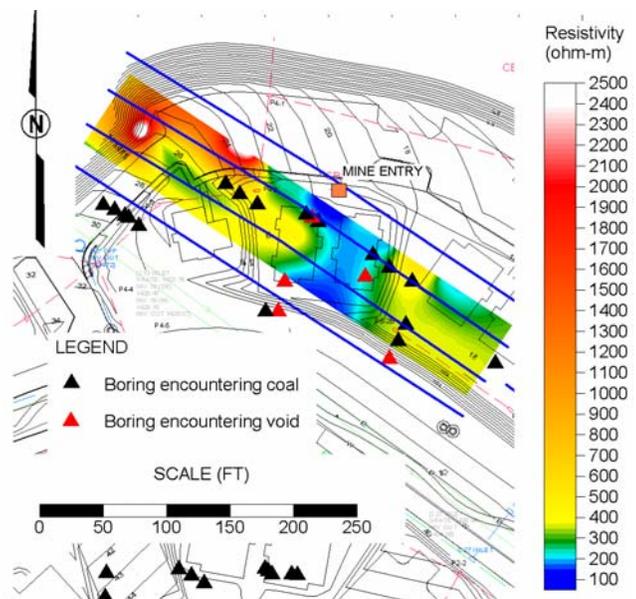
The area where mine workings were known to exist was well defined and indicated that the mine workings spread out laterally from the known entry, but did not penetrate deeply into the hill where construction was projected. Outside of the known mined area, other geophysical anomalies were encountered that borings were



Mine entry exposed at the beginning of construction

able to confirm did not relate to abandoned workings.

The overall result was that the geophysics was able to rule out the presence of mine workings across most of the site and the need for boreholes was minimized. The overall project was able to maintain its originally projected construction schedule and the combination of geophysics and borings reduced what could have been excessive site characterization costs.



Results of a 3D analysis depicting the resistivity at the level of the flooded mine workings in the lower Clarion Coal