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Interpretation of Electrical Resistivity Data acquired at the Aurora Plant Site

by

Neil L. Anderson

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16. Abstract MST proposes to acquire high-resolution reflection seismic data at the Knight Hawk Coal Company construction site. These geophysical data will be processed, analyzed and interpreted with the objective of locating and mapping any subsurface voids that might compromise the integrity of bedrock at a planned construction site. The main project deliverable will be a map showing the location and estimated depth of any voids on the construction site.			
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Neil L. Anderson (nanders@umr.edu)

Department of Geological Engineering and Sciences
127 McNutt Hall, Missouri University of Science & Technology, Rolla, MO 65409

SUMMARY

Two electrical resistivity profiles (A and B) were acquired along separate parallel traverses at the Aurora Plant site. Resistivity profile A was acquired closest to the road; profile B was acquired towards the interior of the building.

Uninterpreted and interpreted versions of these electrical resistivity profiles are presented as Figures 1, 2, 3 and 4, respectively. The subsurface at the Aurora site was imaged to a maximum depth of about 60 feet on each of the resistivity profiles.

The interpreted near-top of intact limestone (black line) and the locations of interpreted clay-filled solution-widened joints have been superposed on the original interpreted resistivity profiles (Figures 2 and 4). The 60 ohm-m contour value was selected as the near-top of intact limestone bedrock; units with resistivities of less than 5 ohm-m were interpreted as clay and/or clay-filled fractured rock. These interpretations are consistent with constrained resistivity data sets we have acquired elsewhere in SW Missouri.

Two borings were located on the resistivity profiles. Boring B-2, located at station 115 (Figures 1-4), encountered rock at a depth of approximately 10 ft. It did not encounter a large clay-filled vug, which suggests that the zone of low resistivity centered at station 115 on both profiles is probably caused by fractured rock and moist clay infill. Boring B-1, located at station 190 (Figures 1-4), encountered rock at a depth of approximately 19 ft. It did not encounter a large clay-filled vug, which suggests that the zone of low resistivity centered at station 175 on both profiles is probably caused by fractured rock and moist clay infill.

The interpretation of the electrical resistivity data suggest that the traverses overlie two sets of solution-widened joints or fractures (centered at stations 115 and 175 on profiles A and B). These features are probably of natural origin, but could have been caused by underground mining activity. It is very likely that the vertical piping of fine-grained sediment through these conduits is causing the observed subsidence.

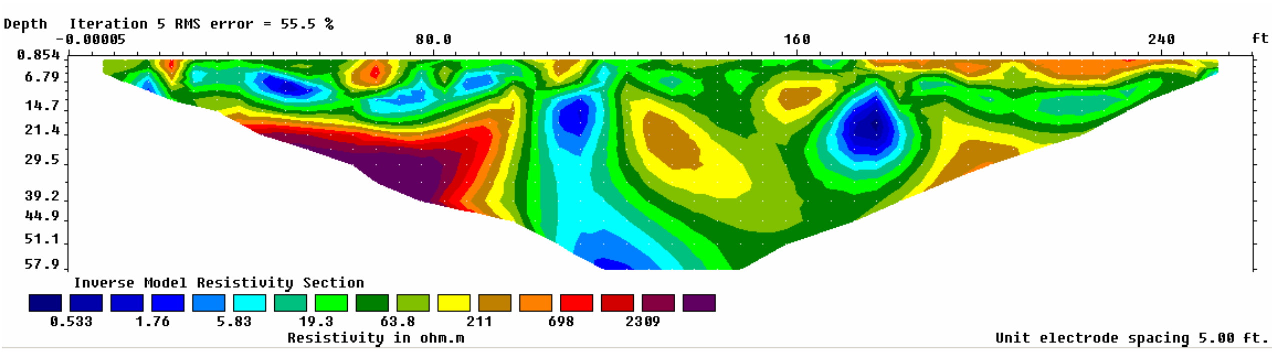

Figure 1: Uninterpreted version of resistivity Profile A.

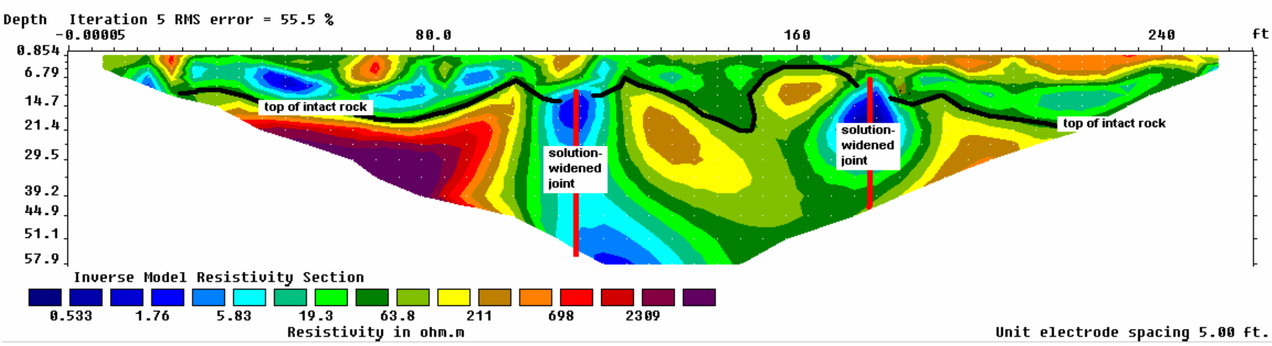

Figure 2: Interpreted version of resistivity Profile A. The top of limestone (black line) correlates reasonably well with the 60 ohm-m contour interval.

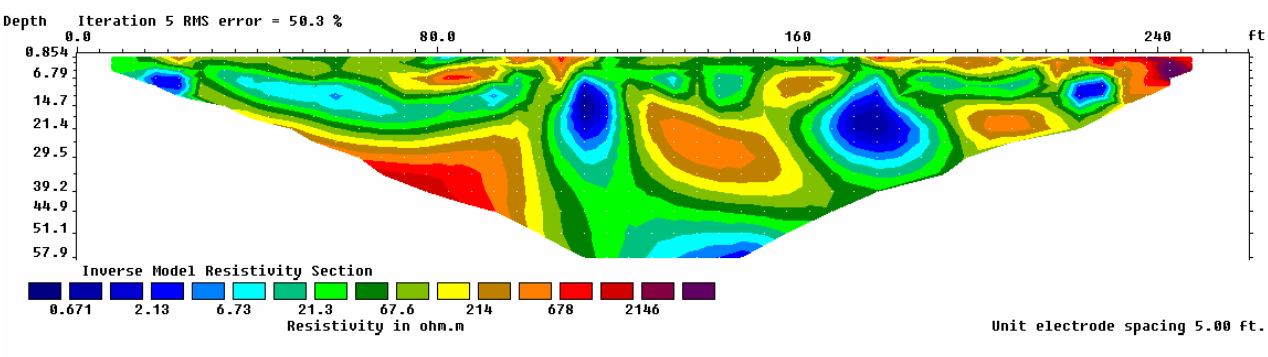

Figure 3: Uninterpreted version of resistivity Profile B.

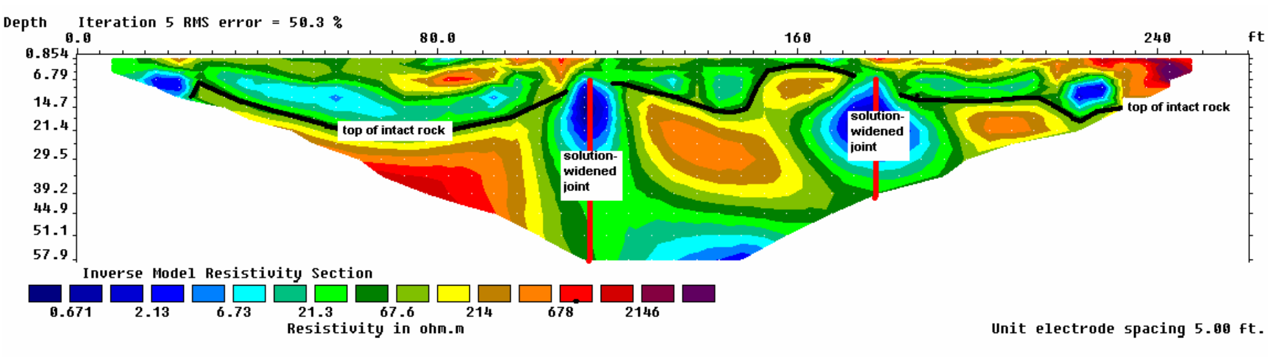

Figure 4: Interpreted version of resistivity Profile B. The top of limestone (black line) correlates reasonably well with the 60 ohm-m contour interval.