

## USING ELECTRICAL RESISTIVITY AND INDUCED POTENTIAL TO CHARACTERIZE HISTORIC LANDFILLS IN KENTUCKY

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Locating horizontal and vertical extent of historical landfills is a top priority for the Solid Waste Branch of the Kentucky Division of Waste Management. The Geophysics Innovations Laboratory at Western Kentucky University has been working with the Solid Waste Branch to use Electrical Resistivity (ER) and Induced Potential (IP) to delineate the extent of multiple historic landfills in the Commonwealth of Kentucky. The two geophysical methods presented provide a synergistic effect allowing for additional information to overcome the challenges associated with the non-unique survey results.

IP is a relatively new technique in geophysics, and has been employed mainly in base-metal exploration and to a minor extent in groundwater searches. In the IP method, voltage is applied across a pair of electrodes and shut off. The system continues to measure the voltage decay of the system at several time gates. The decay time resembles the discharge of a capacitor through a finite resistance. Geobacteria found in established landfills provide a source of capacitance for detection by induced potential.

The Geophysics Innovations Laboratory has developed specific techniques to use IP in landfills using a standard ER/IP multi-electrode system with stainless steel electrodes. We address the all-important factor of contact resistance and keeping the signal to noise ratio low to provide data to combine with ER to delineate landfill extent. We have used the combination of ER and IP on four landfills of varying age and have excellent results. Results of the studies at the four landfills in the Outer Bluegrass, Western Kentucky Coal Field, Purchase Area and Cincinnati Arch regions of Kentucky will be presented to show various site conditions that can be characterized.