

## Electromagnetic Method (EM)

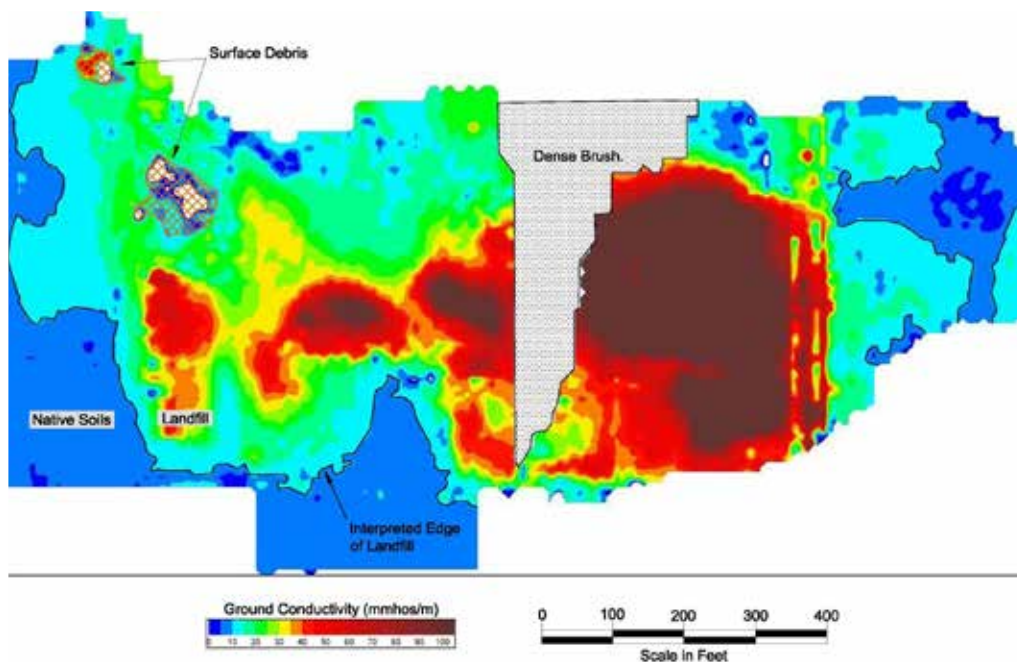
Gannett Fleming's Quantum Geophysics Division (Quantum) uses the electromagnetic method (EM) to locate buried conductive features, such as metal debris, reinforced foundations, metal piping, and underground storage tanks (USTs). EM is the standard work-horse in the industry because it has excellent spatial resolution as opposed to magnetometry.

Quantum owns and uses the Geonics Limited EM61 metal detector to locate conductive targets. Unlike magnetometers, the EM61 is sensitive to both ferrous and nonferrous metal, and the data are relatively easy to interpret. Quantum also uses the Geonics Limited EM31 ground conductivity meter to map landfills and conductive contaminant plumes, such as leachate, salt, dissolved heavy metals, and battery acid.

Landfills tend to be very good conductive targets because of the presence of metal debris and leachate. Once the landfill footprint is mapped, electrical resistivity imaging (2D ERI) or multi-channel analysis of surface waves (MASW) can be conducted to determine the vertical boundaries of the landfill. The geophysical findings can then be used to estimate landfill volume without having to drill exploratory borings.

### Quantum uses EM to:

- Map landfills
- Map conductive contaminant plumes, such as leachate, salt, dissolved heavy metals, and battery acid
- Locate buried metal debris, reinforced foundations, metal piping, and USTs.



Ground conductivity contour map showing horizontal extent of landfill