GeoPotential

ENVIRONMENTAL & EXPLORATION GEOPHYSICS

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# EM61 HIGH-SENSITIVITY METAL DETECTOR (BY GEONICS INC.)

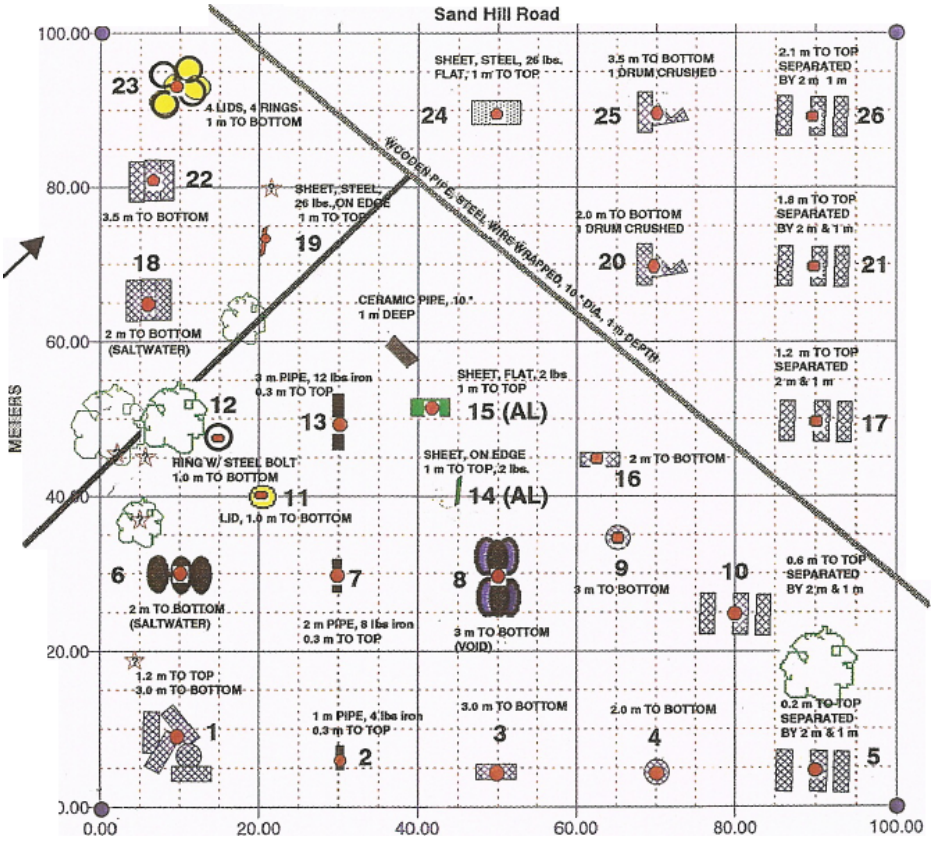
The EM61 represents a breakthrough in instruments designed to find buried metallic targets, such as underground storage-tanks and drums. Based on the most popular electromagnetic method used for mineral exploration, this time-domain technique is used to discriminate between moderately conductive earth materials and very conductive metallic targets. The EM61 consists of a portable coincident loop time-domain transmitter and receiver with an additional receiver for depth-to-target estimations and rejection of near surface target response. The EM61 transmitter generates 150 EM pulses per second, and measures target response during the off time between pulses. After each pulse, secondary EM fields are induced briefly in moderately conductive earth, and for a longer time in metallic targets. The EM61 waits until the earth response dissipates, and then measures the prolonged buried metal response. Conventional inductive metal detectors are generally limited to small objects at shallow depths. The EM61, with larger coils and higher power has been optimized for the larger targets of interest to the environmental industry. Response from smaller, shallow targets can, if desired, be readily suppressed using the differential response from the two receiver coils. EM61 software uses the ratio of the two receiver responses to determine the approximate depth-to-target, most accurately for targets less than one meter in width. Successful applications of the EM6l include locating underground storage tanks, buried drums, pipelines, hazardous metal waste, and unexploded ordnance. With its unparalleled resolution, external noise rejection, depth of exploration and ease of operation and interpretation, the EM61 is the best choice for buried metal detection.

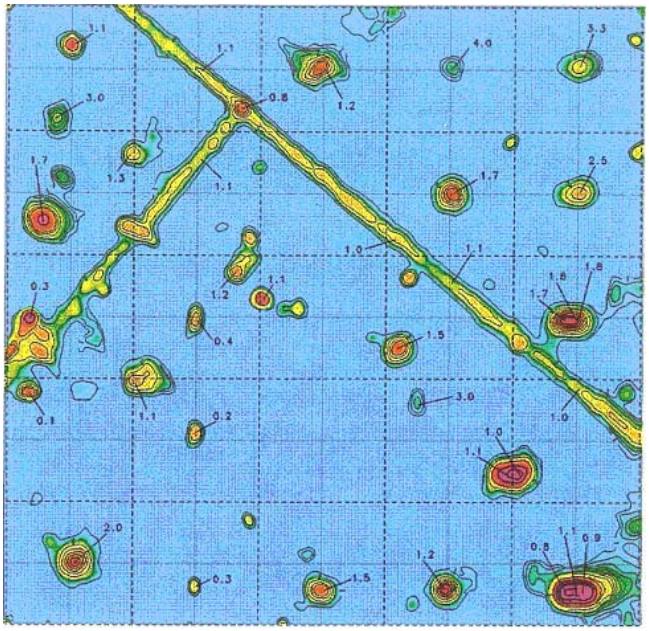
## Stanford University Environmental Test Site

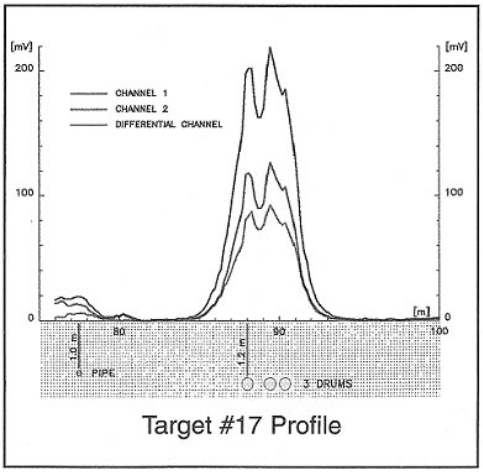
Geometrics Inc., in cooperation with Stanford University, has recently established an environmental test site simulating many of the buried waste situations encountered in the environmental assessment industry. As shown in the site map, metallic and non-metallic objects are buried at 26 separate locations, each representing a potential geophysical target. No chemical contamination is associated with any target. The site provides a good cross section of targets and is an excellent site for testing the Geonics EM61 Metal Detector, not only for response to metallic targets, but also to confirm lack of response to non-metallic targets which would confuse data interpretation. The variety of targets and known depths of burial provides an opportunity to evaluate the EM6l for multiple target discrimination and calculation of target depth. The test area is 100 x 100 meters with targets located mostly in the centers of 20meter grid cells. Measurements were collected every 20cm along NW/ SE lines separated by one meter.

## Geonics EM61 Survey

The survey covered more than 10 line kilometers, producing 50,000 measurements, and was completed in less than one day. The contour map of EM61 data shows, with the exception of target #14, that all known metallic objects, plus a few unknown metallic objects, were easily and accurately located with simple, well defined responses. Target #14 a thin, vertical aluminum sheet striking NW/SE is not evident in the contoured data. Additional data collected along lines oriented at right angles to the target, however, clearly showed an identifiable anomaly displaced about 4.5 meters to the right of the location indicated on the site plan. Although the EM6l is not sensitive to target orientation, survey lines perpendicular to target location improve both the probability of detection and target resolution. To further study this point, a few NE/SW lines were surveyed across targets #5 and #17. The profile of target #17, shown below, taken across three drums, separated by 1.40 meters and 0.4 meters respectively, demonstrates the excellent resolution of the EM61 for multiple targets. In each case, the peak amplitude of response accurately located the target. The discrimination of multiple targets is not always apparent on contour or shaded relief plots. It is important therefore, to recognize that data profiles on their own are extremely useful for both the detection and resolution of target response. The number assigned to each anomaly on the contour plot is the calculated depth in meters to the top of the target. For those targets that can be individually identified, the error in calculated depth ranged from 0 to 85cm, with most errors being 30cm or less.






Target #17 Profile