



Geophysical Techniques to Locate Tanks, Drums, Utilities, and Refuse Disposal Areas

Geophysical techniques are widely used to detect buried metallic objects without disturbing the ground surface. These techniques are especially effective for screening large areas where tanks or drums are suspected but locations are not accurately known, or where hazardous substances in the soil may restrict drilling or excavation. Geophysical techniques are recognized and recommended by the EPA, state agencies, and environmental consultants.

CASE HISTORY:

Magnetic data shown here were collect over a 1/2 acre site where a farm house once stood. The site is now a mowed field with several old fruit trees remaining on the site.

The large magnetic anomaly at the north end of the site was excavated and a 12" steel well guard casing, with an 8" steel pipe inside was unearthed. At the lower intensity anomaly toward the center of the site, a steel septic tank was unearthed.

Other anomalies arise from known surface objects, the power pole, the steel sign post, and the utility vault. Limited exploratory trenching was conducted at two other smaller (in linear dimensions) anomalies, with minor bits of debris identified as possible sources.

The magnetic data shown, together with EM31 data, were collected in half a day using differential GPS system integrated with the data acquisition systems. Electromagnetic data are generally aquired, using either a Geonics EM31 terrain conductivity meter or an EM61 (shown on page 2), together with the magnetic data. The EM response is more sensititive to long linear conductors such as pipes, communication lines, or buried power

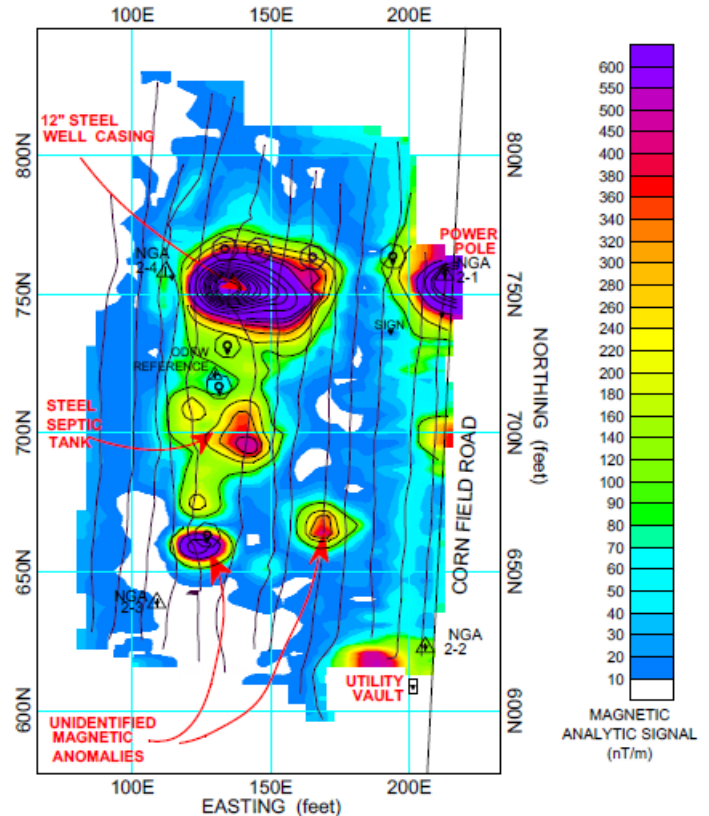
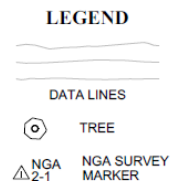


FIGURE 1: MAGNETIC ANALYTIC SIGNAL

lines. Also, terrain conductivity changes associated with brick and clay tile septic tanks and leach fields can often be detected even though no metallic material is present.

The magnetic data is displayed above as the analytic signal. The analytic signal is derived from the total magnetic field data. It is presented as a more concise display of that data set than the raw field data. The analytic signal reduces the bipolar nature of magnetic anomalies (typically a negative peak to the north and a positive peak to the south) to a single anomaly centered over the source of the anomaly.

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GEOPHYSICAL TECHNIQUES



Geonics EM61 "Metal Detector", in Whittier, AK

Electromagnetic Methods (EM):

EM methods can detect any metallic object which readily conducts electricity. These methods are very effective in locating pipes, cables, and other utility lines which tend to be long linear conductors. They are also effective in locating tanks, drums, other buried debris, and even unexploded ordnance (UXO).

Magnetic Methods:

Magnetic methods can detect any steel or iron object. The resolution and sensitivity of these methods depend on the size and shape of the magnetic object and the depth of burial.



G858g Magnetometer with GPS unit,
Portland, OR



GSSI SIR3 with 500 MHz Antenna, Downtown
Portland, OR

Ground Penetrating Radar (GPR):

GPR provides a detailed profile of the near-surface soils. It can often resolve buried tanks, drums and utilities. GPR targets need not be electrically conductive.

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