ABEM

CASE STORY

Landfill and industrial site mapping

| Resistivity and IP |

Landfill and industrial site mapping with resistivity and induced polarization

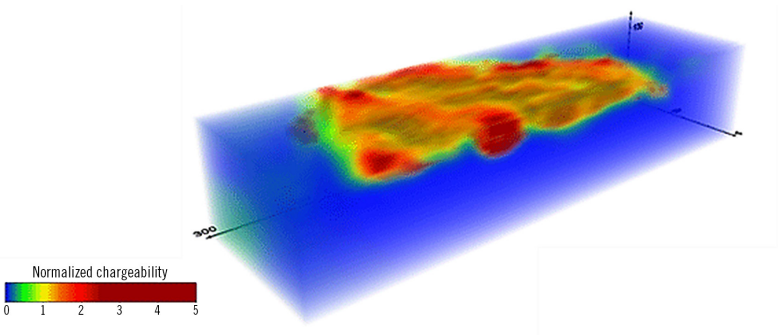
SUMMARY

Mapping old landfill areas or industrial sites becomes more and more important with a growing need of land for development. Resistivity and IP have proved to be an efficient combination to look at the extents of such sites in plane and also in depth.

CHALLENGE

The demand on land for development is increasing as populations and urbanization expand. This sometimes means it is necessary to avoid, or even re-occupy, areas previously used for both landfill and industrial sites. For older facilities, knowledge may be limited on both the extent and the content of the site. To map larger land areas with only traditional geotechnical techniques (for example coring and test-pitting) can be both expensive and result in only point-wise information on what is, most probably, an extremely heterogeneous medium.

3D-model where the higher normalized IP-values show the extent of a former landfill area.



CLIENT

The MaLaGa-project (Mapping Landfill Gas) has been a collaborative research project between universities, public and private sector mainly between 2012 and 2015, but which is still ongoing. The main participating organizations in the project are the Department of Engineering Geology, Lund University, and Tyréns AB. The MaLaGa-project's main aim was to develop techniques for monitoring and characterization of solid waste landfills, based on geophysical measurements.

SOLUTION

Resistivity and IP investigations can be made in combination, at the same time, and the results often show a clear contrast between the fill material and the natural geological formations surrounding the landfill. Resistivity and IP measurements can cover larger areas relatively easily and thus find the lateral extent as well as the thickness of older landfill or industrial sites. Resistivity and IP measurements can be performed in both 2D and 3D depending upon the project requirements. In the MaLaGa-project both investigation techniques were used.

RESULTS

Measurements from the MaLaGa-project provided several clear examples of being able to map the physical extent of landfill areas, both in plan and in depth.

The results also demonstrate that measurements undertaken for mapping landfills may also be used to:

- Locate old landfills
- Determining former landfills' extents
- Estimate areas with different types of material in a landfill
- Provide a basis for further investigation, for example providing a picture of where soil sampling should be performed.

MORE TO READ

More to read on the internal structure of landfills can be found here:
https://malagageophysics.com/index.html
https://malagageophysics.com/publications.html

ACKNOWLEDGEMENT

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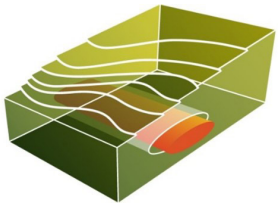
MaLaGa
WE MAKE LANDFILLS TRANSPARENT



PROJECT

Method: Resistivity
Solution: ABEM Terrameter LS
Measurement: 5 m electrode spacing and gradient electrode configuration. Measurements were made both as 2D and 3D projects.
Inversion & Visualization SW: Res2dInv and Res3dInv when several parallel lines were investigated.