

Soil Moisture Probe

Composition

The soil moisture probe (SMP) is installed directly behind the electric cone and permits the simultaneous acquisition of resistivity, soil moisture and geotechnical data. The SMP comprises two ring shaped and carefully isolated electrodes and an application-specific integrated circuit (ASIC). The ASIC uses synchronous detection for accurate measurements, free from electric interference.

Soil moisture

Dielectric soil properties, capacitance and electrical conductivity are governed mainly by the water content of the soil mass. By measuring these parameters between two electrodes with the soil dielectric in between, the soil moisture can thus be determined.

The capacitance of dry soil is determined by its dielectric constant. For dry soil this constant is of the order of 3 to 6 and for water the constant is 80, that is, the capacitance between the two electrodes is dominated by the volume fraction of water.

Contaminated soils

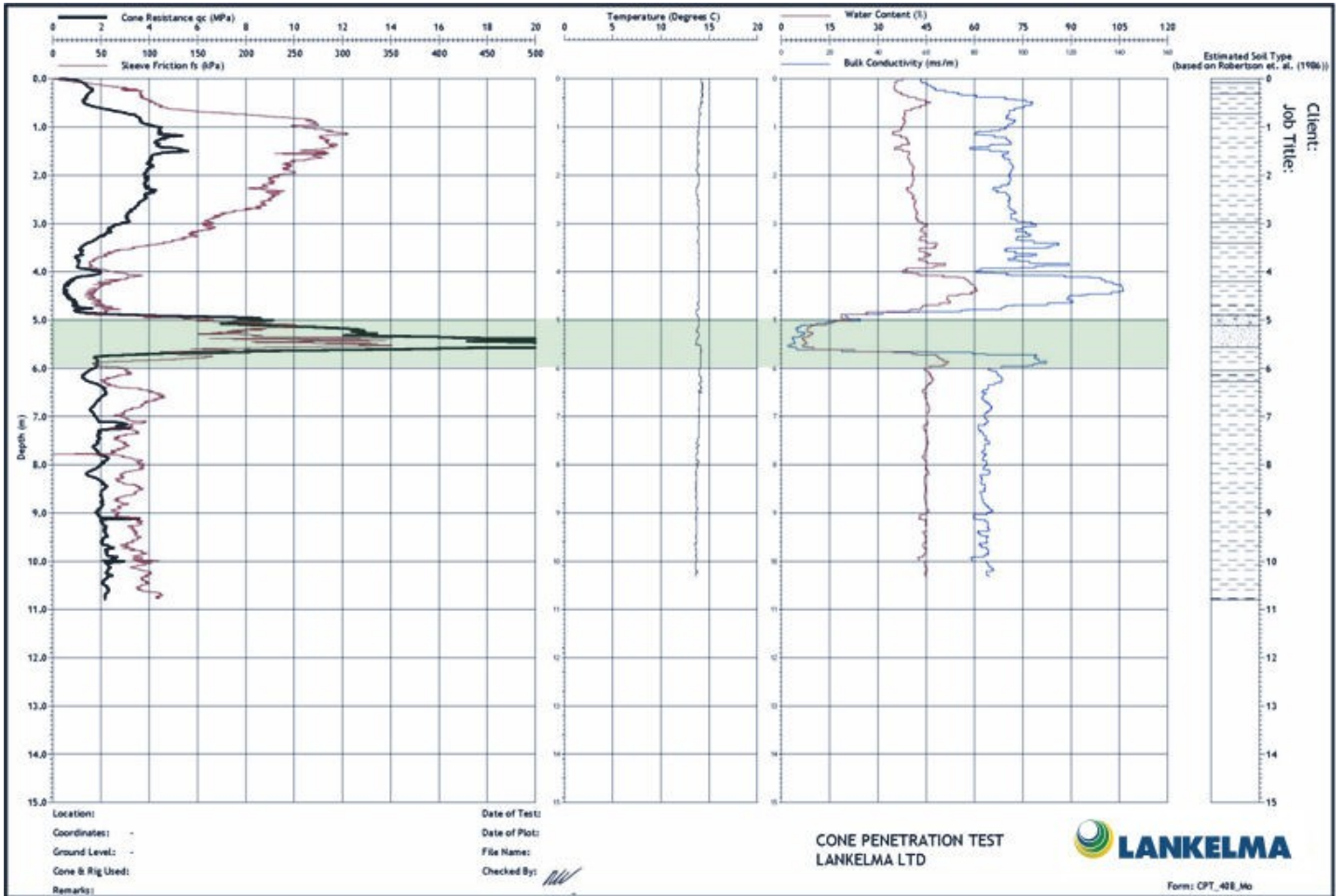
In polluted soils non-aqueous phase liquids (NAPL's), such as oil or chlorinated solvents, will replace part of the water in the soil matrix. As they do not dissolve easily in groundwater they will occur as a film of pure product, often just above the groundwater table.

Dense NAPL's such as chlorinated hydrocarbons, which are denser than water, will penetrate the groundwater table and are typically found on top of impermeable layers. These pollutants affect the dielectric properties of the soil significantly and are detectable using the Soil Moisture Probe.

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This penetration plot highlights a low water content, very dense drained stratum between 5-6m depth (shaded green) and is confirmed by the low water content determined from the soil moisture probe.



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